MAR 29 1949

Dental Digest

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March 1949

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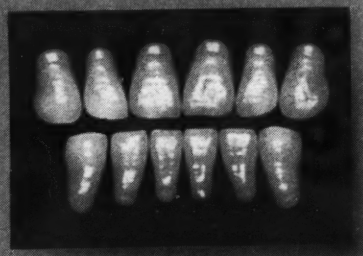

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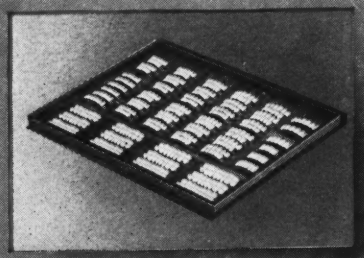

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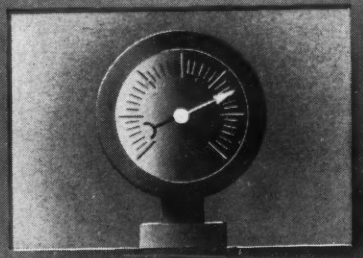

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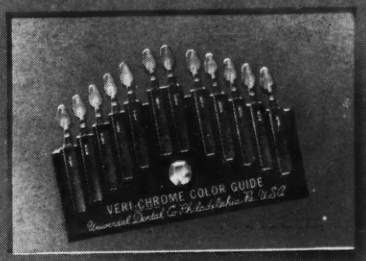

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Vol. 55, No. 3

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Gordon Richmond Winter, D.D.S., (University of Pennsylvania Dental School, 1919) devotes his full time to teaching in the University of Pennsylvania Dental School department of Oral Medicine, and the University of Pennsylvania Graduate School of Medicine. With his article, Transillumination in the Oral Cavity, in the current issue, Doctor Winter makes his first appearance in Dental Digest. Collaborating with Doctor Winter, Frank John Fiaschetti, B.S., (Syracuse University, 1937) and D.D.S., (University of Pennsylvania Dental School, 1946) spends half his time in the practice of oral medicine and in the rest engages in general practice.

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Warren Hayes, D.D.S., (State University of Iowa, College of Dentistry, 1922) has published frequently on various phases of the treatment of malocclusion. In this month's Digest Doctor Hayes discusses in his article, The use of the Castplane and Bite-Stop in the Treatment of Malocclusion, several procedures for the correction of this condition which can be carried out by the general practitioner.

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708 Church Street, Evanston, Illinois

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The magazine is mailed on the fifteenth of the month of issue.

TRANSILLUMINATION
in the Oral Cavity

GEORGE R. WINTER, D.DS, Philadelphia and
FRANK J FIASCHETTI, D.D.S., Binghampton, N. Y.

DIGEST

Transillumination, the act of passing strong light rays through the tissues and cavities of the body, is valuable for purposes of examination. As early as 1865, Julius Bruck, a dentist of Breslau, Germany, used the stomatoscope for transillumination of the teeth and their neighboring regions by means of electro-thermal light. Transillumination, sometimes referred to as diascopy, is extensively used by the medical profession for examination of nasal accessory sinuses, breasts, and vascular tissues. It is also used in oncologic examinations, especially when differentiating hydroceles from solid tumors. However, few dentists have fully appreciated the varied services performed by this type of examination. This article describes the uses of transillumination and gives step-by-step instructions for the proper techniques.

Various Applications

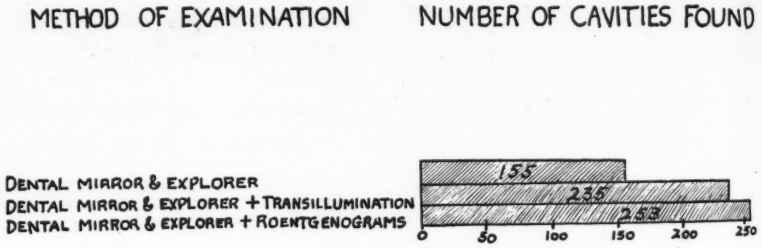
In examining the oral cavity, transillumination is of aid in the following ways:

1. Visualizing calculus.
2. Detecting and determining the extent of caries.
3. Detecting decalcified areas and stains.
4. Determining the size of restorations.
5. Locating the orifices of root canals in the base of the pulp chamber.
6. Locating foreign bodies, for example, metallic objects in soft tissue or broken instruments in root canals.
7. Demonstrating gingival pigments.
8. Diagnosing nasal accessory sinus disease.

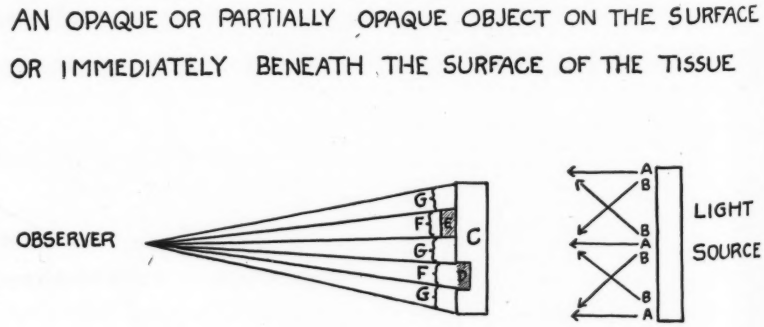
Equipment

Transillumination is not a complicated, lengthy, or expensive procedure. The equipment employed is readily available.

1. A brilliant, concentrated white light. The ordinary dental unit provides low voltage instruments which are entirely satisfactory.
2. Small transformers and resistors which will reduce direct or alternating current to 5 or 8 volts for examination lights, the intensity of which can be controlled by rheostats.
3. The heat emanating from some types of equipment should be reduced



1. *(Chart) Comparison of results obtained from examinations using dental mirror and explorer; dental mirror, explorer, and transillumination; dental mirror, explorer, and roentgenograms.*



2. *(Chart) The optical principles involved in the transillumination of the teeth and their supporting structures. (A) Direct light rays. (B) Indirect light rays. (C) Tooth. (D) Caries or decalcification. (E) Calculus or surface stain. (F) These areas appear lighter to the observer because all light except that lost by diffusion within the tissue passes through.*

3. ***Examination lights for transillumination. Left to right: 1 and 2 Burton, 3 and 4 Cameron, 5 Ritter, 6 S.S. White.***

to prevent burning when the light bulb is in contact with the soft tissues over a long period of time. In an emergency, a small fountain pen-shaped flashlight will serve.

4. A piece of rubber tubing with or without holes cut in the side may be slipped over the bulb to concentrate the light and protect the soft tissues.

5. All parts of the examination light which come in contact with the patient's mouth should be sterilized. Cold sterilization with Metaphen 1:2500 or Zephiran 1:1000 for 20 minutes is effective.

Techniques

Periodontia—1. *Oral* examinations may be conducted in a partly darkened room or in rooms which do not receive direct sunlight. Examination of the *nasal* accessory sinuses require a completely darkened room.

2. Transillumination is effected by having the patient or assistant hold the examination light in contact with the teeth near the gingival tissues except for the examination of sinuses or for pigmentation of the gingival tissues when it is placed in a more apical position.

3. The rays should not shine directly into the examiner's eyes, lessening his visual acuity.

4. The light is held on the lingual side when buccal tissues are to be examined and a mouth mirror is employed when the process is reversed.

5. The gingival sulcus and the periodontal pocket can best be examined when a blast of warm air is directed into them without previous drying.

6. Repeated drying makes the soft tissues adhere to the teeth so that they are not properly deflected by the warm air, thus reducing the visibility in the deeper portion of the pocket. Stains and calculus are thrown into vivid relief as black or brown areas.

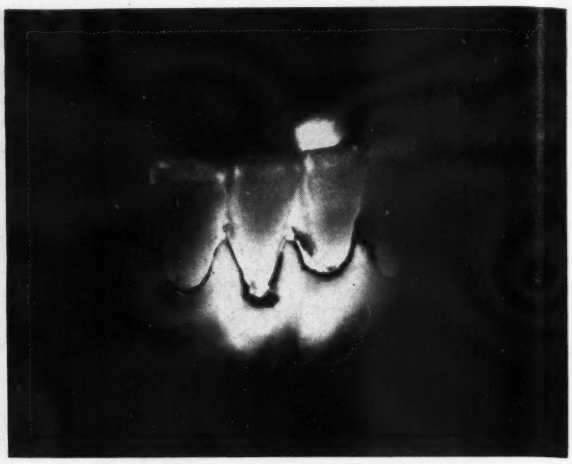
Visualization of Calculus—The use of transillumination to facilitate the removal of calculus is the most important service because of the widespread occurrence and the harmful effects of calculus, the most common irritative cause of periodontal disease. Exploration of the gingival sulcus or periodontal pocket and the detection and removal of all irritants are essential to the successful treatment of all types of periodontal disease. Fewer errors in the detection of calculus are made by direct visual than by tactile examination.

Types of Packs—Calculus deeply located can be visualized with the aid of a pack and transillumination. Many types of packs are used:

1. Eugenol-zinc oxide-asbestos fiber.
2. Paraffin.
3. Gutta percha.
4. Cotton.

The paraffin pack requires the use of a syringe and heater and is easily dislodged by the patient while eating. It is difficult to keep gutta percha at

4. ***Calculus, stain, and bismuth pigmentation.***



5. ***Calculus and stain.***

6. ***Lodge type calculus. Carious lesion on mesial surface of maxillary left central incisor.***

7. ***Stain and decalcification cervically and silicate restoration on distal surface of maxillary right central incisor. Slight decalcification cervically and carious lesion on mesial surface of maxillary left central incisor.***

the correct temperature for proper manipulation and insertion. Cone-shaped pieces of cotton may be packed into pockets for a short time, not in excess of 3 hours, because cotton readily becomes foul and acts as an irritant. It is useful in treating patients coming to the office from distant points. The cotton packs may be inserted in the morning and treatment carried out in the afternoon, saving the patient much travelling time.

Eugenol-zinc Oxide-asbestos Pack—Once mixed, the eugenol-zinc oxide-asbestos pack devised by Williams, has many advantages:

1. It will retain the proper consistency for about 2 weeks if properly stored.

2. The pack is easily inserted with plastic instruments.

3. It hardens in about 20 minutes.

4. The pack can remain in place from 24 to 72 hours.

5. It also prevents irritation of the soft tissue side of the pocket by septic calculus, thereby improving the tone of the gingival tissues. Box has advocated the use of eugenol packs for the treatment of Vincent's infection.

6. Packs containing eugenol materially decrease the number of bacteria present in the periodontal pocket so that when instrumentation is carried out there is less opportunity for a transient bacteremia to occur.

All of these packs aid in giving visibility and accessibility to the periodontal pocket.

The Williams Pack—The formula and instructions for the preparation of this pack are as follows:

The Powder

Zinc Oxide	40 parts
Powdered Colophony (Rosin)	45 parts
Tannic Acid	10 parts
Kaolin (sterilized)	2.5 parts

To the above add 15% by volume finely powdered asbestos fiber.

The Liquid

Thymol	2.0 grams
Eugenol	98.0 Cubic Centimeters

Method of Preparation—1. Place 20 drops of liquid on a heavy glass

mixing slab and incorporate sufficient powder to make an extremely stiff mix.

2. Obtain this consistency by cutting the mass and folding in powder until it resembles stiff putty.

3. Then roll into even sticks slightly thicker than a match.

4. Cut into inch-lengths and store in a small wide-mouthed glass jar where it will be usable for 2 or 3 weeks.

Method of Use—1. Place 1 stick on a sheet of waxed paper and roll in a small amount of powder to reduce its stickiness.

2. A small cone-shaped mass can then be removed with a plastic instrument and forced to the base of the pocket.

3. Allow the excess to fill the interproximal space and protrude slightly buccally and lingually.

4. When the mass hardens, in from 20 to 30 minutes, it will be retained without fear of displacement.

5. The packs may be removed from 48 to 72 hours later and the teeth scaled. To obtain proper visibility by transillumination in deep gingival pockets 2 or even 3 packs may be used in some areas prior to scaling.

Blasts of warm air for the deflection of the soft tissues to permit examination of the periodontal pockets have a beneficial effect which may be attributed to the mechanical cleansing of the pocket.

Pigmentation—Gingival pigments, exogenous or endogenous, are made apparent by transillumination. This covers metallic pigmentation, melanin, graphite, and charcoal.

Caries Detection

1. When the operator is examining for dental caries, the light is held in contact with the clinical crown on the buccal side for lingual areas and on the lingual for buccal areas.

2. Sometimes it is advantageous to move the light apically or occlusally to increase or decrease the amount of light at various angles.

3. The carious areas will show yellow, brown, gray, or black and the outlines of discoloration will indicate the progress of caries.

Comparative Procedures—In order to determine the efficacy of the transillumination procedure in the detection of interproximal caries in the anterior teeth, the following comparative procedures were undertaken:

1. Fifty-three patients were examined to determine the presence of interproximal cavities in the maxillary anterior teeth (the mesial and distal surfaces of the 4 incisors and the mesial surfaces of the cuspids).

2. Each tooth was first dried with compressed air and then examined under ordinary illumination (one four-clustered lamp, total 400 watts) by use of the dental mirror and explorer.

3. Next, this patient was re-examined as before, utilizing transillumination as an added diagnostic aid.

4. Finally, 2 or 3 roentgenograms were taken of the teeth under examination of each patient.

Consistency in Technique—All of these examinations were performed by one operator (Frank J. Fiaschetti) in order to minimize variations in technique and interpretation. A total of 530 tooth surfaces were examined by the above methods. The results obtained are shown in Figure 1.

Interpretation—From a study of Figure 1 the following can be seen: 1. When transillumination supplemented the regular examination (dental mirror and explorer) 80 more (51.6%) carious lesions were detected. 2. The use of roentgenograms in addition to the regular examination resulted in the detection of 98 more (63.2%) carious lesions, or 18 more (7.6%) carious lesions than were found when transillumination supplemented the regular examination. 3. Thus, a fairly close correlation is evident between the use of transillumination and the use of roentgenograms as supplements to the regular examination in the regions studied.

Discussion

1. These results illustrate dramatically the diagnostic value of transillumination in comparison with the dental mirror and explorer in the detection of interproximal carious lesions in the anterior teeth and indicate its importance as a regular part of every routine clinical examination.

2. In addition to the superior diagnostic value of transillumination when compared with the dental mirror and explorer, the figures obtained also demonstrate that in employing the more time-consuming roentgenographic examination of the teeth in question only 7.6% more carious lesions were found than by use of the dental mirror and explorer plus transillumination.

3. Objects of different opacity (light absorbing or light stopping

8. ***No calculus, slight decalcification and stain on mandibular right first bicuspid bucally.***

ability) appear differentiated in outline and shade when viewed by transmitted light. The optical principles involved in the transillumination of the teeth and their supporting structures are illustrated.

4. Figure 2 illustrates why an object such as calculus or stain which is located on the tooth surface, or decalcification, or caries which is just below the surface of a tooth appears darker to the observer than the surrounding tissue.

5. Decalcified areas when transilluminated show gray. If the area is located on the buccal or labial side of the tooth, it may easily be shown to a patient holding a hand mirror. This, coupled with proper instructions in home care, may help to prevent the development of a carious lesion when a cavity has not yet developed.

6. Transillumination aids in the visualization and facilitates the removal of surface stains.

7. The determination of the size of restoration by means of transillumination often aids in treatment planning.

Endodontia

In the field of endodontia transillumination can serve 2 purposes: (1) The location of the orifices in the base of the pulp chamber and (2) the location of broken metal instruments in root canals.

The light should be held buccally or lingually beneath the rubber dam and the tooth viewed occlusally.

Nasal Accessory Sinuses

Transillumination is widely used in the examination of the nasal accessory sinuses. Variations in the size and shape of these cavities, the thickness of the walls, and the pigmentations of the skin may give misleading information. Transillumination is an adjunct to roentgenograms, puncture, and other methods of diagnosis.

Procedure—1. All removable oral appliances should be removed prior to examining the sinuses.

2. The examination light is placed near the midline of the palate, and with the lips closed, the light is moved right and left for better illumination.

The Normal Sinus—The maximum amount of light will be allowed by the normal sinus to pass through the maxillary bones and cheek tissues; the orbits will be pink, the pupils contracted and red, and the patient will experience a sensation of light with the eyes closed.

Variations From the Normal—Non-translucent areas are referred to as shadows, discolorations, or opacities and are associated with increased density, inflammation, tumors, or necrosis. Transillumination will aid in detecting variations from the normal and indicate the need for further investigation.

Periapical and Periodontal Infections

Transillumination may be of value in confirming suspicion of disease in the periapical and periodontal regions. But more accurate information can be obtained by (a) examining the tissues without transillumination, (b) by use of roentgenograms, (c) percussion, (d) the periodontal probe, and other means. We have found that transillumination has a limited use in this field. In some instances transillumination has failed to fulfill expectations of dentists because the manufacturers of equipment have made claims which could not be substantiated.

Patient Education

A patient who is duly informed concerning the condition of his mouth usually wishes to safeguard his health. Transillumination, in certain instances, affords a clear and striking demonstration of pathologic conditions and enables the patient to follow the course of treatment and appreciate the results obtained.

Summary

1. Transillumination is a simple, rapid technique which gives information with a minimum of expense and equipment. It should not supplant routine clinical, visual, tactile, and roentgenographic examination but should supplement these methods.

2. Calculus is more accurately detected by visualization than by probing. Often the operator's tactile sense is not sufficiently acute to discover calculus and it is almost impossible to investigate completely the surface of all denuded roots with an explorer. Transillumination causes less trauma, less discomfort, and consumes less time.

3. Experiments showed that 51% more carious lesions were detected in the anterior teeth by the use of transillumination than by ordinary routine methods, roentgenograms disclosing only 7% additional lesions.

University of Pennsylvania Dental School

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SMOOTH CASTINGS

KARL J. HUMPHREYS, D.D.S., Pasadena

DIGEST

Although most vacuum investing methods in use at present are excellent they require special equipment and extra time. It is no longer possible to invest an inlay, as could be done formerly, forget it until the investment is set, and then start the burnout. The old method was quick but time was spent getting rid of the gold nodules in fitting the inlay in the cavity. The method for using a pressure chamber described herein has given satisfactory results for several years. From a practical standpoint, this simple and economical method for obtaining smooth castings has been found to be very little different from regular vacuum methods.

Various Methods

SMOOTH AND bubble-free castings can be obtained by several methods. The air bubbles placed on the pattern at the time of investing can be made so small by subjecting them to air pressure after investing that they do not appear on the castings.

One simple procedure that has brought satisfactory results is the following:

1. Invest by the old method.
2. Put the invested wax pattern and ring in a pressure chamber.
3. Screw the lid on.
4. Wait until the investment is set.
5. Remove the ring, burn out, and cast.

The inlay ring is put in the pressure chamber while the investment is soft. The compressed air is then turned on and applied until the investment is set. A small piece of investment can be left out as an aid in timing the investment in the pressure chamber.

Equipment Needed—All that is needed for this simple procedure are the following: 1. A short piece of 2-inch pipe and 2 pipe-caps.

2. A rubber gasket.

3. A small lead-in pipe and a piece of pressure rubber tubing.

4. Compressed air, 25 to 50 pounds per square inch. (40 pounds of pressure works best).

Underlying Principles—The physics governing this simple procedure are as follows: 1. Pascal's law, "Pressure applied anywhere to a body of confined liquid is transmitted by the liquid so as to act with undiminished force on every square centimeter of the containing vessel." It is in this way that the air bubbles are compressed so small that they do not reflect themselves in the casting.

2. Gas is reduced in volume by the square of the atmospheres. Forty pounds of air pressure is approximately 3 atmospheres. The size of the air bubble, therefore, would be reduced 3x3, or to one-ninth of its original volume.

Other methods of making pressure chambers could easily be devised. The procedure for making the one that has been used for a number of years and found to be consistently satisfactory is shown in the accompanying illustration.

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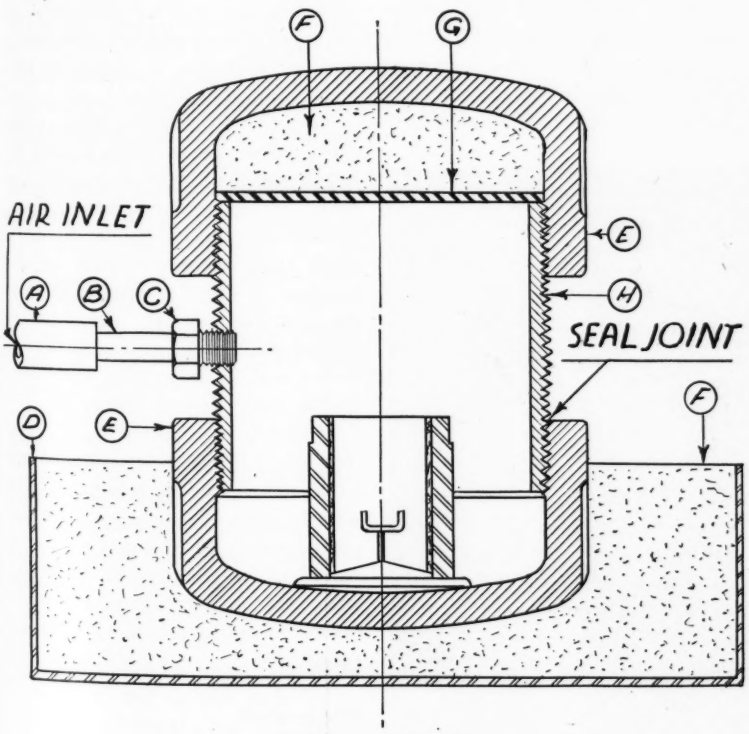


1. ***Pressure Chamber.***

A—Rubber Hose
B—Copper Tubing
C—3-16 Brass Reducer
D—Base (Tincan)
E—Std. 2" Pipe Cap
F—Stone
G—Rubber Gasket
H—Std. 2" Nipple-2" Long

CHANCRES *of the Tongue*

NORMAN TOBIAS, M.D., St. Louis

DIGEST

Extragenital chancres comprise about six per cent of all syphilitic primary lesions. While tongue chancres are not common, they are important from the standpoint of early diagnosis and differentiation from tuberculous and malignant ulcers. Any suspicious ulcer on the tongue should be referred to a competent laboratory for a darkfield examination to rule out syphilis. Features of the condition that are useful as an aid in detecting tongue chancres are precisely enumerated in this article.

Importance of Early Diagnosis

THE ORAL lesions are of great importance to the dentist for two reasons:

1. He may be the first person to observe the lesion. 2. He may expose himself to syphilis if he is careless in his oral examination.

The lesions should be recognized by the dentist; in any case they should be viewed with suspicion. They are more dangerous than genital chancres because the patient seeks medical advice much later than he would for a sore on the genitals.

These lesions are extremely infectious; finger chancres in dentists sometimes occur from contact with primary tongue lesions. Unless the dentist or physician has a high index of suspicion, the tongue chancre may not be diagnosed until after several visits. In the interval innocent people may have been infected. Fournier's dictum still holds good: To diagnose a chancre is no art—to keep it in mind is.

Clinical Characteristics

Primary syphilis of the tongue ranks next to lip lesions in frequency and is fifteen times more common than gum chancres.

Classifications—The lesions are grouped into four types: 1. The common ulcerative or excavated type.

2. The fissured type which occurs in the folds of the tongue.

3. The smooth or sclerotic type.

4. The rare phagedenic or acute inflammatory type.

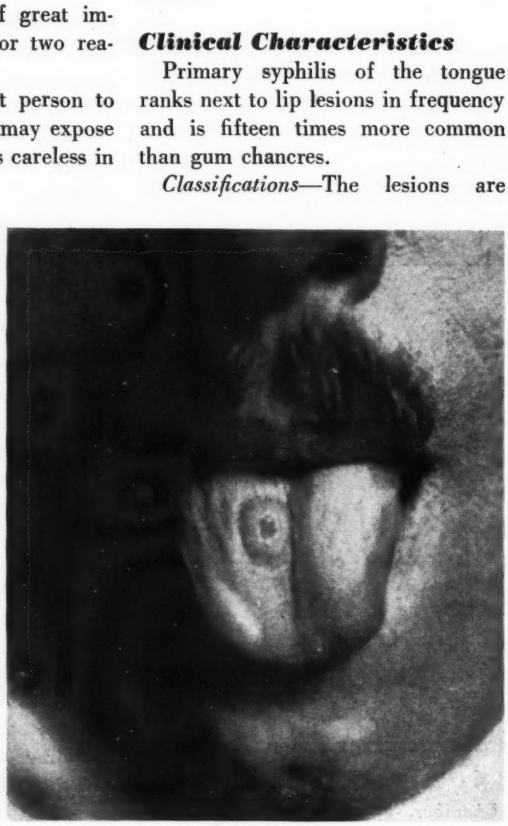
Location—The lesions usually occur on the dorsum of the tongue (90 per cent of them invade this area), rarely on the borders. They usually appearly singly, although two chancres may occur (Fig. 4).

Description—In shape they are round or oval, the surface is smooth or ulcerated, and the color gray or dull red. The base is indurated if palpated with the gloved finger. In some cases there is a surrounding border or collar of edema around the lesion (Fig. 1). Adenopathy is always present and usually involves the submaxillary or submental glands.

Symptoms—Tongue chancres are never painful, there is no interference with function and no deformity of the organ. Fever, which is common in tonsillar chancres, is absent as secondary infection is rare.

Source of Infection—Most cases are acquired directly from kissing infected persons. Indirect contacts include contact with infected pipes, musical instruments, or glassware. In every case, the source must be determined in order to detect and treat the infectious partner. This work is carried out by trained personnel connected with most syphilis clinics or by the Public Health Service.

Prognosis — Untreated tongue chancres disappear spontaneously within 5 to 12 weeks, leaving a slight scar. In some cases a patch of leukoplakia will form at the site after a period of several months. The secondary eruption on the skin appears before the chancre has entirely involuted.



1. *Typical chancre of the tongue with characteristic edematous collar.*

Diagnosis

Features which are of aid in the

diagnosis are: 1. Short duration (2 to 3 weeks).

2. Suspicious contacts (patients may deny this).

3. Age, 20 to 30 (period of greatest sex activity).

4. Clinical characteristics of lesion.

5. Satellite adenopathy.

6. A positive darkfield examination (most reliable and important).

7. A positive blood test.

It is important to remember that the blood test may be negative in early cases, but the darkfield test is always reliable. Therapeutic tests (attempts to cause undiagnosed lesions to disappear with penicillin or mapharsen) are dangerous, unreliable, and unfair to the patient.

Differential Diagnosis

Conditions which may be confused with chancre of the tongue include (a) tuberculous ulcer, (b) squamous cell cancer, and (c) gumma (late syphilis which is noninfectious).

Discussion—Tuberculous ulcers are always painful, ragged, and associated with late cases of tuberculosis of the larynx or lungs. Squamous cell carcinoma occurs in an older group of patients. It is preceded by leukoplakia, the duration is usually several years, evolution slow, and the biopsy section characteristic. Gummas are raised, nodular, or irregular tumor-like growths usually distorting the shape of the tongue, not painful and slow growing. A history of syphilis from 5 to 30 years previously may be obtained, and the biopsy section is also characteristic.

Blood Test not Conclusive—The blood test may or may not be positive. In early cases it may be negative and therefore should not be relied upon as sole means of proof.

Summary

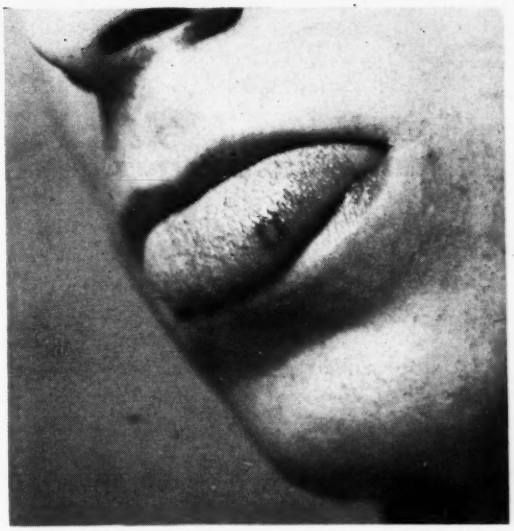
1. Look into every mouth before putting your fingers into it.

2. All ulcers of the tongue are important. If recent, always think of chancre.

3. The only sure diagnostic method is the darkfield examination.

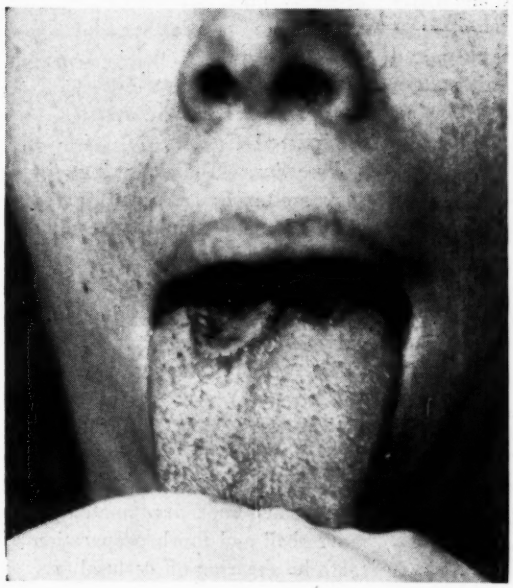
4. Remember to keep your index of suspicion for syphilis high.

631 *North Grand Blvd.*



2. ***Early chancre of the tongue.***

3. ***Ulcerative type of tongue chancre with some surrounding inflammation from local treatment.***



4. ***Multiple excavated chancres of the tongue. The secondary eruption can be seen on the face.***

The New Metal and Wax Pattern for PRECISION CASTINGS

LOUIS M. BROWN, D.D.S., Brooklyn

DIGEST

One of the most difficult problems long encountered in prosthetic dentistry has been the preparation of a wax pattern either by the direct or indirect method, that would give reasonable assurance of an accurately fitting cast gold crown. This problem has been solved by the introduction recently of a metal shell. Various applications and explicit directions for the use of this shell are presented.

An Adjunct to the Direct Pattern Method

1. The shell acts as a tray and reinforcement for the wax; it is invested with the wax, and remains an integral part of the pattern.

2. The shell is low fusing, is entirely eliminated with the wax, and leaves a clean mold for casting (Fig. 1).

3. The method of use is clean and fast so that distortion of pattern through handling is obviated. The resultant castings have proved accurate in hundreds of tests.

1. ***The shell is entirely eliminated with the wax leaving a clean mold for casting.***

Description

Superficially the shell resembles an aluminum shell. There are several important differences: 1. Its inside and outside surfaces have an "orange-peel" finish so that the wax will stick to it.

2. Instead of a comparatively sharp corner, the dome has a rounded, easy slope from crown to side which aids in obtaining crease-free adaptation.

3. The shell is soft and has no spring.

4. It can be stretched easily, without tearing, to fit over the bell of a tooth.

5. It can be slit and overlapped, scraped, inscribed, and carved with ordinary hand instruments, or sandpaper disced to a feather edge.

Full Crown Wax-Up for Teeth with Sound Original Cusps

Procedure—The following simple steps are taken: 1. Preparation of all sides of tooth should be completed with corners blended.

2. The occlusal surface is left uncut for anatomic reproduction and carving.

3. A tight-fitting shell is festooned and stretched over crown of tooth until closed part is in direct contact with cusps.

4. Burnish metal occlusally in grooves and reproduce anatomy. Remove shell and finish preparation of tooth by shearing off occlusal surface and clearing bite about 2 millimeters.

5. Contour all sides of shell with contouring pliers to give added anatomy and contact points.

6. Fit on to prepared tooth and check bite. If shell is too long gingivally, inscribe with pointed instrument along gingival, while holding in place. Remove and trim to line inscribed. Replace on tooth, readapt, and check bite again.

7. When bite is satisfactory, make two escape vents by cutting or burring two holes in the shell each about 2 millimeters in diameter, one buccally, and one lingually.

8. Introduce soft wax by dripping, or place piece of wax in shell and pool to a liquid state with a hot spatula. While wax is still fluid place shell immediately on tooth and check bite.

(With the available low fusing inlay waxes this operation does not have to be hurried. The wax should be kept liquid to allow the excess to escape through the holes and to prevent spreading at the gingiva).

9. Remove by teasing off and dry outer surface.

10. If bare spots of metal are present on inner surface (Fig. 2), coat outer surface opposite with wax.

2. ***If bare spots are present on the inner surface of the shell the metal should be coated on the opposite side with wax.***

Elimination Process — When melted, the metal is fluxed by the wax which aids its flow. If bare spots are present the elimination is retarded. This condition usually occurs (a) along the gingival edge because the shell is tight fitting and (b) in the occlusal because the bite is usually not cleared enough in preparation of the tooth.

Complete Wax-up — If contact points are short, add wax on outer surface, mesial or distal, as needed. Wax-up is now complete and should be sprued on a cusp with sticky wax. Use one sprue only so that when in ring, sprue hole down, the point of connection will be lower than any other part of pattern. The sprue should be 11-gauge, or the thickness of the shank of a bur.

Method for Full Crown Wax-up for Broken-down Molar Bicuspid

1. After the tooth is completely prepared, a tight-fitting shell, festooned and burnished as closely as possible so that bite and contact points are well cleared, is stretched over it.

2. Now remove the shell and bore 2-millimeter holes buccally and lingually.

3. Dry the inside of shell.

4. Introduce wax which must be kept liquid, and place on prepared tooth.

Remove Shell—There is now a thin wax lining to compensate for possible discrepancies between adapted shell and prepared tooth. Dry outer surface and build wax up on occlusal part of shell. Replace shell on tooth and soften outer wax so that it can take registration of bite from opposing tooth.

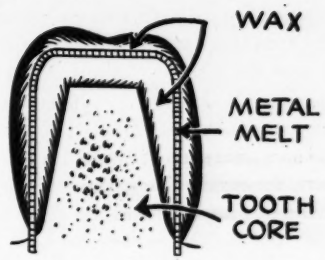
A Metal Shell—A metal shell, ready to be invested, has now been obtained between two layers of wax. Sprue in the same manner as shown in Figure 3. This method is also used for bite-raising.

Three-quarter Crown Abutments for Molars and Bicuspids

1. Three sides of the tooth should be parallelled with resulting corners blended.

2. The occlusal is left alone for anatomic reproduction and carving.

3. Select a tight-fitting shell, festoon and fit it so that the dome is in direct contact with the occlusal surface.

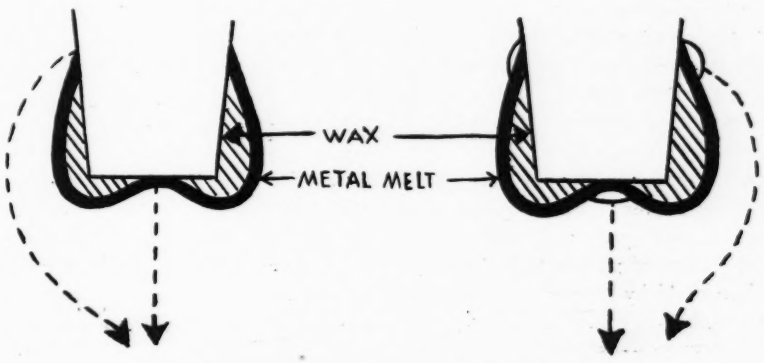


4a. *Wax is introduced inside of dry shell and kept in liquid state.*

6. Cut away and discard labial portion. A three-quarter shell or tray is now left.

7. Finish preparation of tooth by grinding off occlusal and making grooves.

8. Fit three-quarter shell on prepared tooth, burnish margins to end of preparation and check bite.



4b. *Shows method and correction for thin spots.*

4. Burnish metal into surface for occlusal and anatomic reproduction and carving.

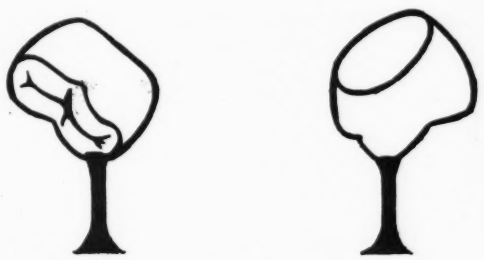
5. Remove and contour mesial, lingual, and distal portions of shell with contouring plier. This improves anatomy and restoration of contact points.

(Because the occlusal has been ground away, the bite has driven the shell further on the tooth, resulting in blanching of gum tissue).

9. Scribe metal along gingival edge; remove and trim to line with shears.

10. Replace on tooth, readapt, and burnish gingivally and marginally with a final bite-check.

Hole is Drilled Through Shell—Excess wax is allowed to escape through a one or 2 millimeter hole which has been drilled near the occlusal. Introduce the wax, which should be low fusing, into the shell or tray with a hot wax spatula and pool to a liquid state. Place immediately on the prepared tooth and register bite.



3. *Use one sprue only.*

Excess Wax—With a warm spatula wipe the excess wax that has escaped through the hole or seeped through the margins. Gently burnish margins and dry the surface of the metal. If bare spots are present on the inside of the pattern, the outside of the pattern should receive a coating of wax opposite the bare spot. The pattern is now ready for investing.

Sprueing and Investing

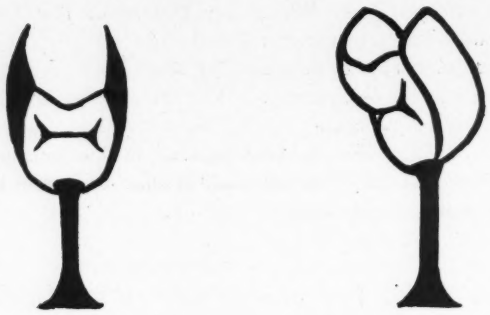
One sprue only is attached to pattern with sticky wax. The sprue should be about the thickness of the shank of a bur.

For a Bicuspid—The sprue should be placed on the lingual cusp of a bicuspid at an angle so that if pictured in casting ring with sprue hole down the connection to cusp with sprue will be lower than any other part of pattern.

For a Molar—The mesial or distal (buccal or lingual) cusp is used for a molar; the sprue is applied in the same manner. Proper inclination of pattern to sprue pin will aid metal in flowing down out through sprue while flask is in oven, sprue hole down. The use of one sprue only with correct inclination of pattern to it, insures a clean mold by proper elimination of metal.

Burning Out

This metal flows with the aid of (a) the inlay wax lining or coating, (b) the gravitational pull of correct inclination of sprue hole, and (c) tapping at the critical flowing temperature while sprue hole is down.



5. *Position of sprue for three-quarter casting.*

Method—1. Place the inlay ring in cold oven, sprue hole down.

2. Start the temperature at medium heat; raise gradually to 850-950 F.

3. Now tap the rim of ring lightly on the floor of oven or laboratory bench until no metal appears. Return to oven until mold is ready for casting.

Tapping—The reason for tapping at the critical flowing temperature is to clear out traps which might have been set up by improper inclination of pattern to sprue pin. If tapping is omitted at this time, the metal will oxidize and stick to mold in its trap, thus preventing a perfect result in casting.

Use of Timer —When an oven with a pyrometer is not available a trial should be made to determine the length of time required for the furnace to reach the temperature at which the metal runs out of the sprue hole. The use of an alarm or time clock is advised to warn the operator when case is ready for tapping.

Summary

1. Procedures involving the use of the metal shell require no copper band preparations.

2. Time is conserved because no carving of wax and no occlusal grinding is necessary.

3. Distortion or breakage of wax does not occur and the final fit is assured.

4. Wax-ups are quick and clean and results are accurate.

257 *Livingston Street*

The Evaluation of Dental Caries*

J. M. WISAN, D.D.S.

THE FOLLOWING are the conclusions drawn by the evaluating committees and reported the final day of the workshop:

1. *The Mechanism of the Caries Process*— a) Dental caries is a disease of the calcified tissues of the teeth.

b) It is caused by acids formed by the action of microorganisms on carbohydrates. It is characterized by a decalcification of the inorganic substance of the tooth, accompanied or followed by a disintegration of the organic material.

c) The lesions are apt to occur in certain areas of the tooth and their type is determined by the morphology of the tissue in which they appear.

2. *The Relationship of Systemic Conditions to the Caries Process*— The effect of the caries process on the tooth (the caries lesion) is made possible by circumstances in which structures which retain sufficient acid come in contact with the tooth substance. These factors include:

a) The dental plaque.

b) The anatomic structure of the tooth.

c) The position or arrangement of the teeth in the dental arch.

d) The presence of dental appliances.

No single factor may be construed as the general cause of all dental caries. Clinical studies and reviews show that:

a) Pregnant women have no higher rate of caries than non-pregnant women.

b) Sickness, general health, or nutritional status have no significant bearing upon the dental caries process. (*Continued on page* 138)

An ANOMALY of the Upper Third Molar Area

THOMAS E. VISSING, D.M.D., Carson City, Nevada

DIGEST

What appeared by visual and roentgenographic examination to be a problem of the simple extraction of the upper right and left third molars presented unforeseen difficulties. The method of dealing with a condition not often encountered is described in this case report.

Case Report

The patient, a middle-aged woman in excellent health, presented for the removal of the upper right and left third molars. The only remaining teeth in the maxilla were the right and left central incisors and left lateral and cuspid.

Molars Appear Normal—In size and position both third molars were objectively normal and presented what seemed to be simple extractions.

Roentgenogram Normal—A roentgenogram made six months before, disclosed nothing unusual except a slight cloudiness around the right third molar. No particular significance was attached to this as the picture was somewhat faded.

Extraction Attempted

After anesthesia was induced and the gingival tissue was freed from the surrounding bone, an attempt was made to extract the right third molar.

Considerable Resistance Encountered—Even though careful and positive force was applied, the tooth could not be luxated or moved in any direction.

Second Attempt to Extract—A flap was laid back and three or four millimeters of bone removed. A second attempt to dislodge the tooth was no more successful than the first.

An upper third molar with a fused fourth molar and attached portion of palatal bone.

Third Attempt—More bone was removed both buccally and lingually. When forceps were again applied, this time with increased force, a cracking sound was heard. It was thought immediately that a root had been broken.

An Anomaly Existed

Obviously something was definitely amiss. Visual and digital examination disclosed that the tooth was loosened, apparently, but when pressure was directed buccally a considerable section of the palatal bone was observed to be fluctuating. The bone was fluctuating even to the *left* of the median line.

Procedure

1. Slow careful dissection with scalpel and osteotome finally freed the two fused teeth.
2. The fourth molar, lying directly medial to the third, was undoubtedly attached to the palatal bone and could not be removed without fracturing it.
3. After replacing the fractured part of the palate, the wound was cleaned, then packed with sulfathiazole and iodoform, and the wound closed with sutures.

Recovery

The following three or four days were extremely difficult for the patient. She lived 18 miles away, had no means of transportation, and was unable to make an office call. About ten days later, however, she reappeared and except for a certain amount of soreness and edema, was progressing well. Six weeks later an immediate denture was made. This functions perfectly despite the fact that a large part of the right maxillary tuberosity is missing. The third left molar was normal and was removed without difficulty.

Sweetland Building

The Use of the CASTPLANE *and* BITE-STOP *in the Treatment of* MALOCCLUSION

WARREN HAYES, D.D.S., Waukon, Iowa

DIGEST

The increasing prevalence of malocclusion makes the problem of special concern to the general practitioner. Orthodontists are too few to care for all those in need of such service and many patients are unable to spare the time for the trips to the orthodontist. A large percentage of patients are handicapped because of economic maladjustments. The general practitioner should be prepared to treat certain cases of malocclusion.

Types of Malocclusion

It has been adequately proved that (a) the commonest type of malocclusion, which is characterized by labial prominence of cuspids, can be cured by judicious extraction of teeth at any age up to 15 and without any appliance whatever and, (b) that the second commonest type of malocclusion, which involves transposition of teeth, can be cured with simple methods including operative techniques familiar to every competent dentist.

Early Detection Important

1. The second type of malocclusion is easily corrected if it is not allowed to remain until maturity.

2. If it is detected during eruption of the malposed teeth, the solution is simple.

3. Correction becomes progressively more difficult as the child develops and the teeth become more firmly anchored in their sockets. But until a patient is 12 years of age, treatment will surely result in correction.

4. Beyond the age of 12, patience is required but most conditions of malocclusion will respond well.

The condition is conspicuous so that parents often seek help when the child is only 7 years old. This is fortunate because (a) at any age up to 12, the masticatory apparatus has unlimited resiliency and adaptability, and (b) still dependent on older people, the child is less inclined to be rebellious.

Those who work with children are constantly surprised at their ability to adjust to various situations when convinced by their elders that it is necessary.

The Orthodontic Castplane

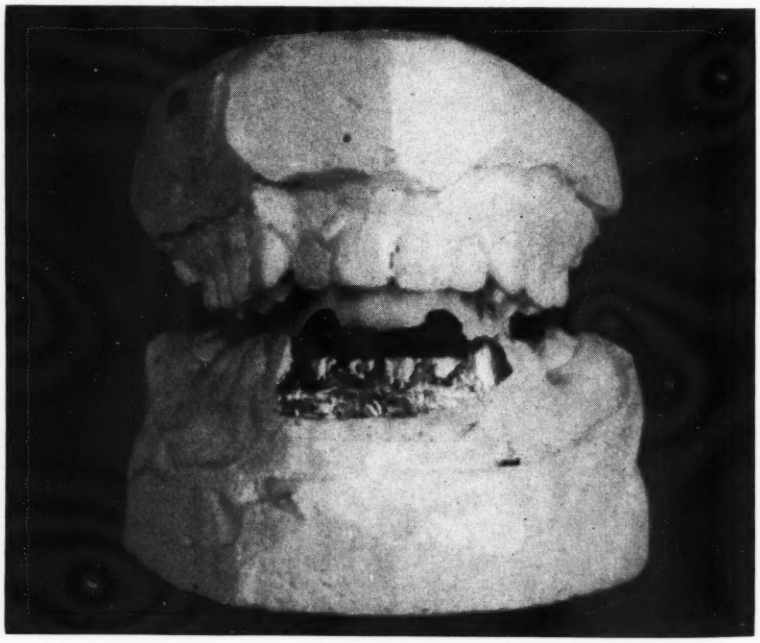
1. The castplane is the mechanism that is used to shift malposed teeth from lingual to labial occlusion. It is a cast gold, inclined plane cemented on unmutilated teeth.

2. It is constructed to permit the malposed teeth to strike the plane of the casting during mastication.

3. The sliding of the tooth toward normal position eventually shifts it beyond its opposing tooth and into normal position.

4. Usually it is necessary to construct only one castplane but occasionally two or more with progressively steeper planes are required.

5. These planes are not difficult to construct and it is not much trouble to make more than one.



1. *Casts mounted and wax formed and carved over tin foil.*

6. Castplanes may be cast for one or many teeth and may be cast in sections and soldered together. Or the sections may be cemented separately.

Construction of the Castplane

Several Methods—1. Simple cases of malocclusion may require only a model of the supporting teeth made of inlay investment, on which the wax form of the castplane is carved, finished, and invested as with an indirect inlay technique.

2. Some wax patterns may be made by pressing an amorphous mass of inlay wax over the supporting teeth and forming the planes in the patient's mouth where conditions of occlusion can be studied most readily.

3. When the planes are formed, the wax is removed and the tooth forms filled with inlay investment. (Cristobalite).

4. After this has hardened, the wax can be carved and finished before the final investing is done.

A Simple Procedure—Until the dentist has acquired considerable experience with castplanes, the following procedure is advised:

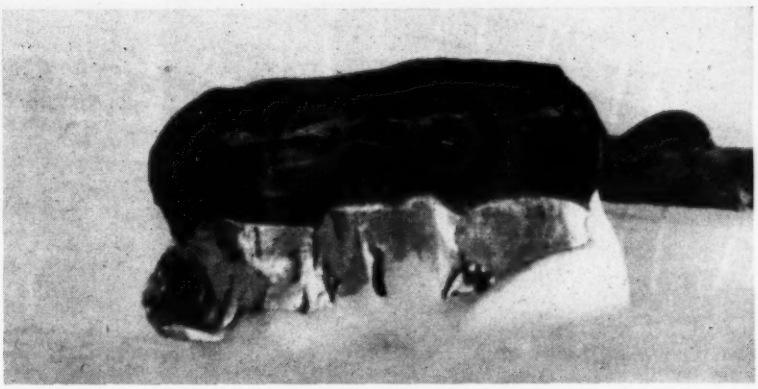
1. Impressions of upper and lower arches should be made and cast poured with plaster of paris.

2. These casts are then mounted in an articulator, using a thin wax bite as guide unless intercusping is definite and unmistakable.

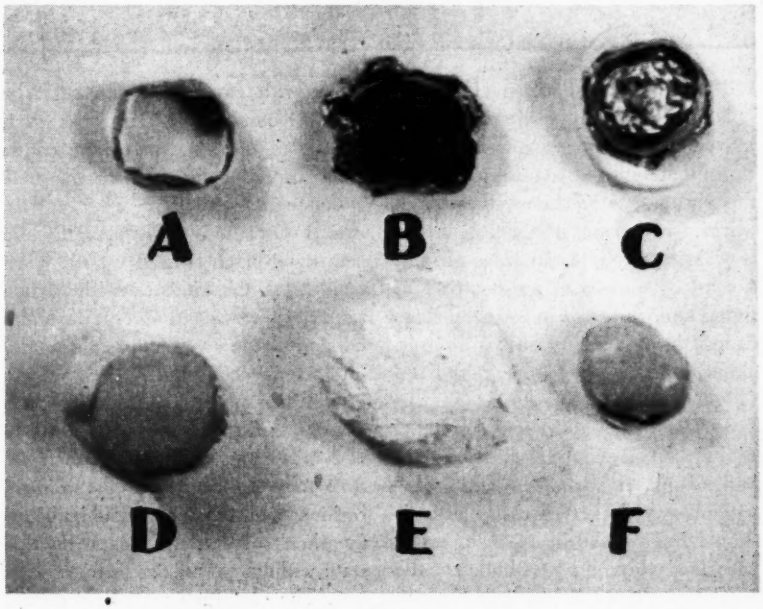
3. Tin foil should be burnished over the teeth that are to support the castplane. Foil, .001 in thickness, is most easily adapted.

4. Medium hard inlay wax is formed over the tin foil and built up to form the inclined guide plane, using the opposing teeth as a guide to form and size of the guide plane (Fig. 1).

5. This wax and tin foil assembly is slipped off the teeth, sprued, invested, and cast like a large inlay, the foil melting into the gold (Fig. 2).



2. *Wax and tin foil removed and ready for investing.*



3. *Various steps in constructing the bite-stop. (A) Gold band contoured for supporting tooth. (B) Tin foil draped over tooth, band placed over foil and wax forced into band. (C) Plaster of paris poured into tooth form and wax removed. (D) Acrylic resin built into occlusal of band while in wet sand stage. (E) Band and resin encased in ball of plaster of paris and cured. (F) Band with resin trimmed and ready for fitting in the mouth.*

The Bite-Stop

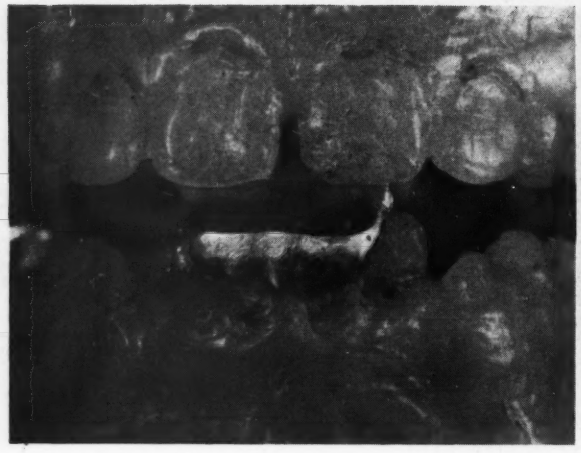
This safety device is a modified shell crown with a heavy occlusal surface made of acrylic resin and serves (a) as an aid to mastication during the adjustment period, (b) as a protection against injury from accidents or while playing, and (c) as a comfort to the patient during sleep as teeth are sometimes under stress while being readjusted.

The most accessible molar may be used as a supporting tooth and should not be mutilated in any way.

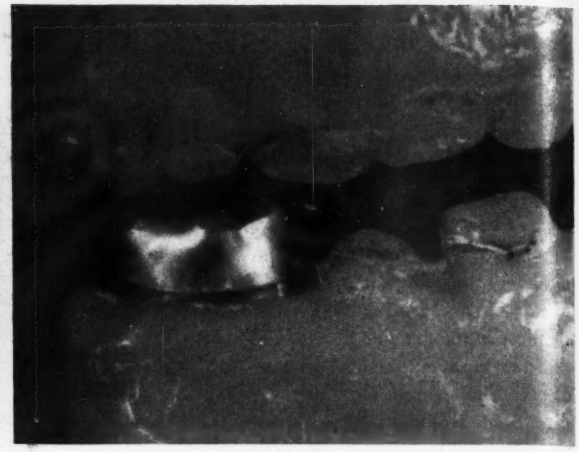
Construction of the Bite-Stop

1. A band of 29-gauge, 22-carat gold plate is made to fit loosely around the unmutilated supporting tooth. The band is trimmed and contoured roughly as a band is contoured for a shell crown. The cervical edge should be contoured inward to avoid undue irritation of the gum margins (Fig. 3A).

2. Tin foil of .001 thickness is draped over the supporting tooth and the band is placed in position. A ball of baseplate wax is warmed and forced into the gold band against the tin



4. *Castplane in position.*



5. *Bite-stop trimmed and in place on first molar.*

foil and allowed to stiffen (Fig. 3B).

3. This assembly should be removed gently and the tooth impression filled with plaster of paris. When the plaster has hardened, the wax is warmed and removed (Fig. 3C).

4. Mix acrylic resin in a proportion of 3 volumes of powder to 1 of liquid and while it is in wet sand stage drop it in the band until it is built up about ¼ inch above the gold band (Fig. 3D).

5. When the resin has stiffened slightly the assembly is encased in a ball of plaster of paris (Fig. 3E) without any flask. When hardened it should be dropped in a pan of water and slowly brought to a boil. Let the assembly remain in the water about ½ hour when the plaster may be cracked away. Fast curing is allowable since porosity is not detrimental and is often an advantage as it is more easily trimmed.

6. The resin should be roughly trimmed and finished (Fig. 3F).

Placement

Placement and use of the castplane and bite-stop is accomplished as follows:

1.The castplane is cemented on supporting teeth as a large onlay. No mutilation of the teeth is necessary but it is permissible to sandpaper the slightly exposed incisal edges flush with the plane (Fig. 4).

2. Place the bite-stop in position on the unmutilated supporting tooth, mark with carbon paper, and trim with a coarse stone. This process is continued until the castplane comes into strong occlusion with the malposed teeth.

3. Polish the bite-stop roughly and cement in place (Fig. 5).

4. Mark the bite-stop with carbon paper at intervals of several days and trim until the castplane again comes into strong occlusion.

5. When the molars on the opposite side from the bite-stop are within ½ of a millimeter of occlusion, the bite-stop may be removed; the natural resilience of the teeth would absorb the shock of extreme closure at this state without permanent injury.

6. The castplane may be removed after a few days, or it may be retained without injury or discomfort if the operator wishes to be certain no retrogression will take place.

Precautions

1. The supporting teeth are usually smooth and tapered; it is therefore difficult to estimate the form of the casting to provide adequate retention and yet be easily removable. If the castplate loosens, it is permissible to use an abrasive, such as prophylactic pumice, to remove the high gloss from the teeth. Thorough scrubbing with alcohol before cementation will remove mucus and aid retention.

2. In carving wax patterns for castplanes it is well to be sure that the incisal edge of each supporting tooth is exposed and that there is a thin layer of wax on the band encircling each tooth. In case of difficult removal the thin part may be cut through with a suitable instrument and the cut edges pried up slightly to loosen the cement. Bulk of gold is contraindicated as it prevents such manipulation.

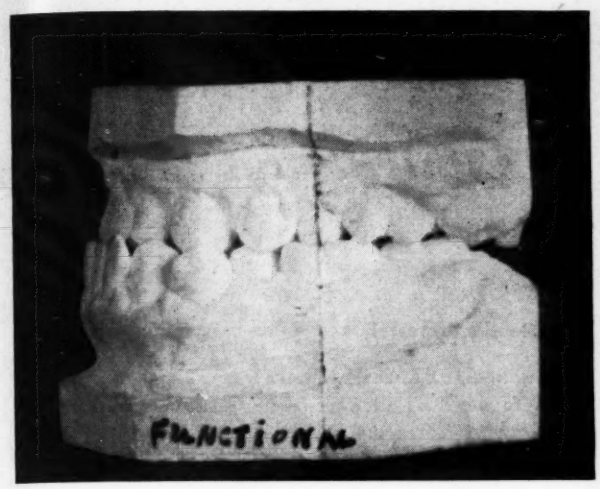
3. Castplanes having several supporting teeth should be placed as soon after impression taking as possible, as movement of the teeth may make placement difficult. Not more than 2 days should intervene.

4. Anatomic prognathism contraindicates use of the castplane. Functional prognathism, described later, responds amazingly well.

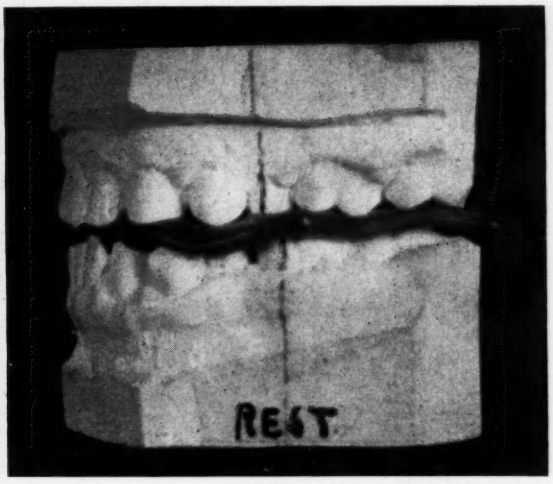
5. With children predisposed to caries the plane should be removed at intervals to be certain there is no caries under the castplane. Copper cement should be used if caries will complicate the situation.

6. Removal of the castplane is usually quite simple. A few taps on a chisel with a small gold malleting hammer will loosen most of them. If this does not give results the gold bands may be cut as outlined heretofore. The bite-stop should be removed with an old-fashioned crown slitter.

7. Children are often reluctant to have the appliances removed—they are marks of distinction that cannot be duplicated by many of their playmates. For this reason it is often unwise to let the child know when they



6. *Casts of prognathous person in functional position.*



7. *Casts of prognathous person in rest position.*

are to be removed or he may "forget" his appointment.

8. When cuspid teeth are used as supports for the castplane it is often necessary to provide additional retention by casting a tiny pin as an integral part of the castplane. The simplest method of accomplishing this is to sink a small bur about 1½ millimeters into the tip of the cuspid. A plastic pin, inserted in this hole before forming the wax, will burn out with the wax and the gold will cast into the hole to form the pin. When the castplane is to be removed the gold is stoned until the pin is free and will remain in place when the castplane is removed.

9. If there is marked crowding of teeth the tension must be relieved by extraction. The dentist should familiarize himself with the rules for this type of orthodontic treatment before sacrificing any teeth.

Prognathism

In the developmental stages prognathism is usually transposition of anterior teeth. If not treated, it is hopeless to attempt a cure after the age of 15, except by means beyond the skill of the average general dental practitioner.

Early Treatment Important—Castplanes, properly constructed and used, will cure almost all prognathic conditions up to the age of 15 but correction is much more quickly and simply performed in the preadolescent years. Fortunately, the condition is so easily diagnosed that parents usually report it in ample time.

Treatment—Except that castplanes will usually be larger, often involving 6 or more teeth, treatment of incipient prognathism is identical with that for simple transposition of incisors. Some judicious grinding of molars may be desirable when occlusion has been shifted to its normal relationship.

The Symptoms—A mesial shift of the mandible during the masticating function is the symptom that assures success in treatment of this condition. Figure 6 shows casts of a prognathous individual mounted on waxbite which registers complete occlusion. Figure 7 shows the same casts mounted on waxbite which registers rest position as nearly as possible.

Application of a castplane on lower anteriors of this patient will result in an immediate retrusion of the mandible of about 3 millimeters, the upper incisors will be adjusted labially to allow occlusion of the molars. After the age of 12 it may be necessary to use the castplane long enough to allow extrusion and retrusion of teeth to balance the molar and bicuspid relationship. Judicious grinding of unworn cusps may also be desirable.

Possibility of a Natural Readjustment—In the absence of the functional shift illustrated in Figures 6 and 7, the general practitioner should be reticent about promising good results from use of the castplane. It is true, however, that in some cases lack of mandibular retrusions is due to unnatural development of the soft tissues of the glenoid fossa and use of the castplane is desirable to determine the possibility of a natural readjustment of these tissues.

Summary

1. Castplanes will correct transposition of anterior teeth at any age up to 15. After this age results are erratic and uncertain.

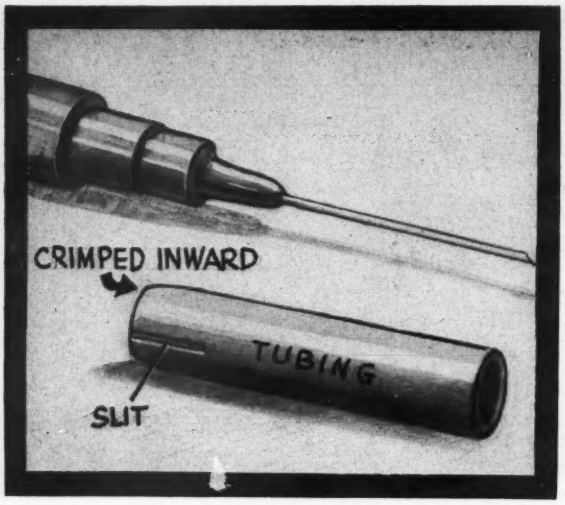
2. Stops should be used on posterior teeth, (a) to provide masticating area during readjustment and (b), to control speed of adjustment.

3. Incipient prognathism is usually curable with castplanes but diagnosis is highly important to avoid disappointment.

The Cover

The cover photographs are "before" and "after" views of an interesting case from the files of Doctor I. F. Miller, Pittsburgh, Pennsylvania.

Clinical and Laborato

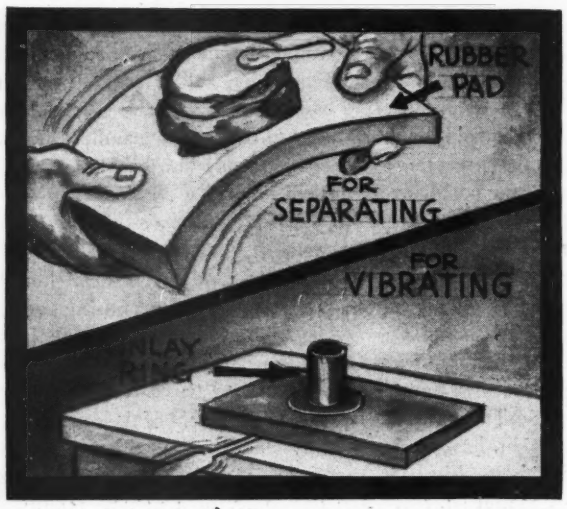


1

A Needle Protector

H. H. Hicks, D.D.S., Bisbee, Arizona

1. To protect a hypodermic needle against breakage during boiling in the sterilizer, cover the needle with a sheath of chrome plated tubing. The tubing is cut to proper length, split at the hub end, and crimpled to fit snugly over the hub.

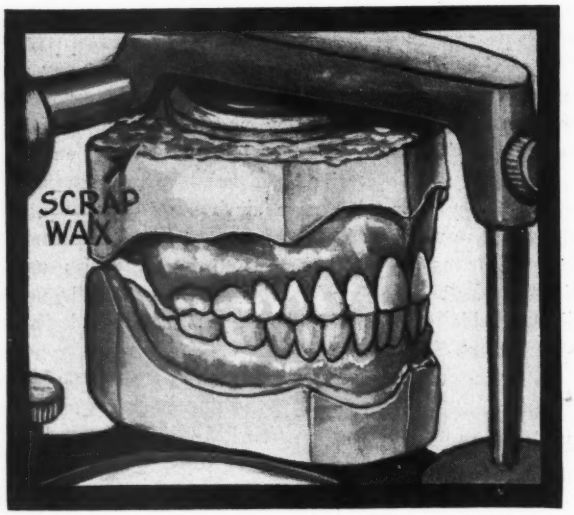


2

Uses for a Rubber Kneeling Pad in the Laboratory

H. Nelson Bentley, D.D.S., Louisville

2. An inexpensive rubber kneeling pad, available in any hardware store, has many uses in the laboratory. It is convenient to use when pouring models. After the model material is set, the pad is bent which allows easy separation from the model. Another use is in investing inlays. The ring is placed on the pad on the laboratory bench. A spatula or other suitable flexible tool is used under the pad. The vibration is readily transmitted through the pad when the investment is being poured.



3

Mounting Casts on the Articulator

R. B. Hindenach, D.D.S., Parsons, Kansas

3. A thin film of baseplate or scrap wax melted on top of the cast before plastering to the articulator is used for easy removal without breakage. When the cast is ready to remove from the articulator insert a knife at the wax line and pry off.

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SUGGESTIONS . . .

A Wax Holder

Robert V. Hattenhauer, D.D.S., Des Plaines, Illinois

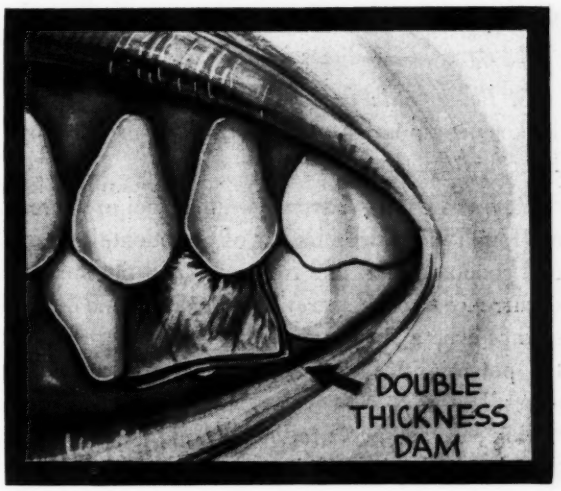
4. Four spoons are bent at right angles. A round form is made of boxing wax or lead. The form is poured in model stone. The bent spoons which have previously been waxed or wired together are imbedded in the stone. When the stone has set the form is removed and the spoons are filled with the waxes of choice. This holder will not tip, is easily cleaned, and the wax is convenient for use.

4

Adjusting Occlusal Surfaces of Wax Patterns

R. W. Stever, D.D.S., Tyrone, Pennsylvania

5. After the wax pattern is carved and the occlusion is satisfactory, place a double thickness of rubber dam over the pattern and have the patient close and make functional movements. A pattern treated in this way will produce an inlay that does not need extensive occlusal adjustments.



5

Adding Wax to a Pattern

J. W. Siegfried, D.D.S., Santa Monica, California

6. It is at times necessary to add wax to a discrepancy in a wax pattern. A simple method is to warm the beaks of a pair of operating pliers, apply to a stick of wax, and carry to place at the discrepancy in the pattern. When the beaks are opened slightly the wax will flow and cover the proper place.

6

suitable illustrations; write a brief description of the technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time.

Turn to page 136 for a convenient form to use.

Send your ideas to: Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S Page

EVERY CLINICIAN has observed the marked improvement in well-being that frequently follows the treatment of gingivitis and periodontitis. Tissues that are the sites of inflammation show alterations in chemistry. It has been demonstrated by Menkin[1] that five chemical substances are produced in inflammation:

1. *Leukotaxine*—increases local capillary permeability and diapedesis of leukocytes.

2. *The leukocytosis-promoting factor* (LPF)—induces a discharge of immature leukocytes from the bone marrow.

3. *Necrosin*—exerts a necrotic effect on local cells and, after absorption into the blood stream, on distant organs.

4. *Pyrexin*—induces fever.

5. *Leukopenic factor*—induces leukopenia, the leukocytes apparently being trapped in the lungs, liver, and spleen.

Ray and Orban[2] have shown that foci of necrosis are found in the deep tissues of periodontal pockets and conclude that "the frequency and the multiple occurrence of such necrotic foci in a chronic disease stamps even a simple gingivitis as a disease having the potentialities of leading to systemic disturbances."

Box[3], in the Jarvie fellowship address, mentions that the mechanism of tissue breakdown involves a necrotizing agent containing enzymes and that this agent is likewise "carried and disseminated to the deeper and more remote structures in a devious manner."

When we begin to comprehend that disease of the soft tissues of the mouth is not merely some local phenomenon but rather a morbid process from which chemical substances enter the blood stream to be carried to distant parts, we will then begin to revise our attitude toward therapy and toward focal infections. We have been traditionally concerned with bacteria and their end products as the causative factors in disease. The contributions of Menkin, Box, Ray, and Orban that have been cited point out the danger of noxious *chemical* substances that are carried through the circulatory system to be deposited in other tissues.

Box warns us of our preoccupation with inflamed tissue. He stresses the clinical fact that in some of the more serious forms of periodontal disease there is no obvious gingivitis but that the vicious necrotizing process is occurring in the deeper tissues. The simplex or inflammatory form of periodontal disease is a slow process with marked local reactiveness. The complex or degenerative form is rapid without pronounced local reaction. Both forms, however, must be considered to be potential foci of systemic disease.

These important clinical conclusions are drawn by Box: "Our conclusions, based on our interpretation of the findings, place a heavy responsibility on the dental profession. It is generally agreed that the sulcus region can be the portal of entry of toxic substances and that the dental practitioner should be the guardian of this gateway. We know that too often incipient periodontal disease in its most destructive form is not recognized. We are also aware that subtle gingival changes must have taken place prior to our too frequent and belated discovery of deep pocket formation and extensive damage of the deeper supporting structures. This serious form is often found in comparatively clean and well-cared-for mouths.

"Some of the failure to detect the first signs of this disease must be ascribed to the emphasis which has been placed on marked gingival inflammation. The idea that obvious gingivitis is the first stage of this condition is a fallacy. Through our concentration on displayed gingival inflammation, we have failed to perceive the early stages of the insidious necrotizing process.

"In these early stages, the outer surface of the gingival margin loses its normal stippled appearance and becomes smooth and shiny. This change may extend as a narrow or broader band which parallels the gingival edge, or it may show variations in width, blending with the adjacent stippled surface. Where a line of sharp demarcation occurs, it creates a festooned effect. The color of this shiny zone may differ very little from the neighboring stippled surface, but it is frequently slightly cyanotic."

[1]Menkin, Valy: Biochemistry of Inflammation, Lancet (May) 1947.
[2]Ray, Harold G., and Orban, Balint: Deep Necrotic Foci in the Gingiva, J. Periodontol. **19**:91-97 (July) 1948.
[3]Box, Harold K.: The Significance of Recent Findings in Periodontal Pathology, New York State D. J. **14**:543-551 (December) 1948.

MEDICINE and the Biologic Sciences

Clubbed Fingers

Clubbed fingers and toes have been observed clinically for many years. Hippocrates first mentioned clubbing in a case of empyema. Since that time and until 1942 little was reported about the condition. It was routinely accepted as evidence of congenital heart failure.

Since 1942 there has been considerable interest and some progress has been made by several investigators. Many factors have been suspected as playing a part in the etiology. Toxic, neurotic, mechanical, static, and anoxic factors have all been suggested. None has been fully accepted. It appears that chronic arterial anoxia has the most in its favor as an explanation. It is quite well established that clubbing is seen in the cyanotic group of heart diseases of a congenital nature. When clubbing occurs in other types of heart disease it is usually the result of chronic sepsis or severe pulmonary disease.

Long residence at high altitudes, chronic methemoglobinemia, sulfhemoglobinemia, and chemical alterations in the hemoglobin which impair its efficiency as a carrier of oxygen may be causes of clubbing.

The basis of the theory is that a raised erythrocyte sedimentation rate is associated with intravascular rouleaux formation. This obviously impairs gaseous exchange. It is often seen in patients with clubbing. The biconcave structure of the erythrocyte is ideally suited to its respiratory function. It provides the largest surface area in contact with plasma and facilitates efficient gaseous exchange.

In health a maximum cell surface is available for the release of oxygen into the tissue. Red cells whose individual circulation is restricted by becoming a part of a collection of many cells are less effective as carriers of oxygen. Aggregations of cells present to the surrounding fluid medium an increase in mass and a reduction of surface from which there can be a gaseous exchange.

These findings are important because clubbing as a diagnostic aid has frequently been misused. Two things seem certain at the present time. The most dramatic type of clubbed fingers and toes in congenital heart disease is present only if cyanosis is a factor. There is also another type of clubbed fingers which is in no way associated with heart disease. In this type, the finger nails are markedly concave and the finger ends are broad. These are sometimes referred to as spade fingers and no one has ever suggested a cause for them.

The work of Taussig and Blalock confirms the present-day concept. It has been seen that in surgical intervention to correct cyanotic heart disease clubbed fingers and toes usually disappear.

Symposium: Clubbed Fingers, Internat. M. Digest 53:244-245 *(October)* 1948.

Eneuresis

Eneuresis or bed wetting is a common condition and is generally treated by the family physician. It is nearly always a symptom of a psychologic disturbance. Nevertheless, all patients should have the benefit of a thorough physical examination to rule out abnormality or disease of the genito-urinary tract.

Ordinary bed wetting is a physical, mental, social, and family problem, and not merely a symptom of the child's genito-urinary system. Bed wetters are usually nervous, high strung children of parents with similar traits who have bequeathed instability to their children.

After diseases or abnormalities have been ruled out, treatment consists in re-educating the parents and the child. The following specific suggestions have been found to be of value in controlling eneuresis:

1—Do not talk about bed wetting in the child's presence. Children like to be the center of attraction and while they may manifest great unhappiness when the bed has been wet, they secretly enjoy the turmoil that they have produced. They may have a subconscious feeling of importance, revenge, or whatever the unknown motive is for continuing to be a bed wetter. It matters little whether they are kissed or spanked, just so that someone is worrying about them and paying attention to them.

2—The child should not be punished or commended; this focuses the child's attention on the subject which should be minimized.

3—Allow the child to sleep through the night unless he wakens voluntarily to void. When the child is first trained it may be advisable to rouse him. In time this becomes unnecessary. It often serves only to antagonize the child and perpetuate the problem. He alone must learn to control the bladder and learn that no one can control it but himself.

4—Bed linens and pajamas should be changed only when making routine changes of linen for the rest of the family. This may be once or twice weekly. The wet linens and clothes should be dried and replaced. The child will tire of the odors and rough clothes when he discovers that he is the only one suffering from the habit.

He should not be rewarded by being given clean linen and pajamas.

5—The twenty-four hour intake of all fluids should be limited. If the child drinks one-half as much liquid during the day, he will urinate only one-half as much day or night. Give only a small glass of milk with each meal and none between. Avoid all juices. Never refuse water, but give him only about one-half as much as usual. Moderate restriction of liquids is on a purely physiologic basis.

6—Medication should be resorted to only for a trial period. It is probable that the physiologic effect of the alkaloid of belladonna may help "dry up" some of the urinary secretions. One tablet of Belladenol may be prescibed at bed time on a physiologic and psychologic basis. The psychologic basis is probably of more importance than the physiologic. This treatment is given a limited trial for about two weeks. If the child still wets the bed it is useless to continue the drug.

Many patients need the benefit of psychosomatic or common sense advice. The peculiar terms used in training small children is a related factor. When infants and toddlers have to tolerate such expressions it is truly remarkable that we do not have more eneuresis problems. Common sense and patience are needed.

Clein, N. W.: Common Sense Treatment of Eneuresis, Northwest Med. 47:281-282 (*April*) 1948.

Referring Patients Legal Responsibility

A novel problem has arisen in the medico-legal aspect of medicine and dentistry. Is there ever a legal obligation to refer patients? To the practitioner it is a moral issue. The patient's welfare involves the legal aspect.

The problem is of mounting significance because of the trend towards specialization and the increasing standards of care. Cases of this nature are not the ones in which the operator recognizes an emergency and almost invariably sends the patient to a hospital or to a specialist. They are the cases which the practitioner considers to be in his own field even though he lacks the learning, skill or equipment required by current good practice in the community.

Legally the physician, surgeon or dentist courts the risk of liability for malpractice when he is unable to provide the facilities known by the average practitioner to be necessary but holds on to the patient without disclosing the risk, offering to refer, or consulting an associate. The same danger arises when he is able to carry out a desired procedure but only by a method which involves risk to the patient. When others are equipped to apply a method so much safer that all danger is eliminated, the risk warranted becomes less.

An important decision was handed down in 1938 by the Supreme Judicial Court of Massachusetts which illustrates the point forcibly. In Vigneault vs. Hewson Dental Company the defendants had on several occasions injected procaine hydrochloride by pressure into the plaintiff's gums before removing abscessed teeth. As a result severe osteomyelitis of the plaintiff's jaw developed. The evidence showed that the danger of such a sequel was rather slight but that other dentists in the community could have reduced the risk almost to nothing because they were equipped to use "deep block" anesthesia which the defendants did not know how to apply. A judgment for $4,500.00 was awarded the plaintiff.

The court contended, "a finding of negligence was not precluded, even though there was a substantial probability that harm might not actually result from the use of this method of anesthetization. A choice by a dentist of a "less safe" method rather than another well-known method may constitute failure to exercise the required skill in extracting the plaintiff's teeth."

The defendant's dentists should have advised the plaintiff to seek a dentist who was equipped to use a safer method of anesthetization.

Practitioners have frequently been held negligent because of failure to secure roentgenograms in diagnosing or following up fracture cases. Many of these men owned no x-ray apparatus, the use of which would have meant referring the patient to some one else, calling in a consultant with a portable machine or even surrendering the case to a hospital.

Because of the increasing disparity between the equipment an individual practitioner can afford and that available in hospitals or other medical institutions, this duty of reference, which has entered into cases at law, is of profound importance. Whether a given case should be referred can be reasonably assured by adverting to the important criterion, "What is the practice of the average practitioner in the community in respect to referring such a case?"

Smith, Hubert Winston: Legal Responsibility for Medical Malpractice, American Medical Association, Chicago, pages 114-116, 1942.

Removal of Adhesive Tape

The removal of adhesive tape is an unpleasant procedure to the patient. Varying degrees of traumatic reactions have been noted as a result of the removal of adhesive tape, especially when applied over extensive areas or areas with hair.

To make the process easier for both the operator and the patient, a group of men tested various agents. The final agent of choice was propylene glycol ethyl ether. This is noninflammable and nontoxic.

In the series of tests three types of tape were used: (1) the adhesive in which there had been incorporated fatty acid salts, (2) the hospital adhesive routinely used and (3) the specially prepared patches which are widely used. For purposes of comparison patches of tape were allowed to remain on for 48 hours in two series. In one series the solvent was used; in the other the tape was pulled off the skin. Observations were made immediately after the removal, one-

half hour and twenty-four hours later.

The special adhesive remained on the skin in 95 per cent and the hospital adhesive remained on the skin in 90 per cent of the persons but there was some curling at the edges and wrinkling in the center. The prepared patches fell off in more than 30 per cent of the patients.

Because of its pronounced adhesive qualities, removal of the special fatty-acid adhesive usually gave a well defined reaction. When the solvent was used, the percentage of patients showing reactions dropped perceptibly so that at the end of twenty-four hours only a little over ten per cent showed some erythema.

The reaction to removal of the specially prepared patches could not be evaluated because of the poor sticking qualities of the patches. With the regular hospital tape the reaction to removal showed a decrease when the solvent was used.

At the end of twenty-four hours, a small percentage of persons showed varying degrees of reactions. In a few instances the reactions had increased in intensity. This was probably a true irritation.

From these observations the results are quite conclusive that propylene glycol ethyl ether renders the removal of adhesive tape painless. More important, it greatly reduces the traumatic reaction.

Glick, A. W.; Weisberg, G.; and Peck, S.: New Adhesive Tape Remover in Patch Testing, Jour. Invest. Dermat. **10**:399 (*May*) 1948.

Recent Highlights

Researchers at Chicago's Michael Reese Hospital believe that there is a relationship between nutrition and cancer. This conclusion was derived from twelve years of cancer research. Animals on restricted diets do not develop cancerous growth to the same extent as those on normal diets. Overweight animals tend to develop cancer more frequently than underweight animals. Obese persons are more prone to cancer than those of normal weight. It may well be that cutting one's calorie intake may have a bearing on one's susceptibility to cancer.

Cardiologists at Northwestern University Medical School state that fear, anger, disgust, grief, joy, surprise and yearning are dangerous emotions. All produce irregularities in heart rhythm. The only emotion not producing heart attack is pity or sympathy with the grief and misery of another. Anger is the worst enemy of the heart and causes more anginal pains than any other disturbance resulting from emotions.

A psychiatrist recently made the statement that most ambition is simply an inferiority complex turned inside out. Extremely ambitious persons are uncertain whether they will be able to keep up in a competitive environment. They drive themselves harder than most normal individuals. As a consequence they go much farther in life.

Some bacteriologists have discovered that bacteria which apparently have been killed by streptomycin can be restored to normal activity after as long as three days by the action of a mysterious "inhibiting" factor. This may help to explain why certain disease organisms develop a tolerance for some of the anti-biotics and why drugs are sometimes effective against certain bacterial infections and at other times are not. The so-called "inhibiting factor" is so far a mystery not only as to its chemical structure but also as to its origin. It is unknown whether or not it is produced by the bacteria themselves or whether it comes from other sources in their environment.

Hospitalics, Hospital Topics **26**:11-12 (*May*) 1948.

Medicine and the Future

Rapid and extensive changes have been noted during the past twenty years in the traditional function of the hospital in its relation to the practice of medicine. The medical profession is now entering a critical period in which it will be decided whether the fields of diagnostic, therapeutic and preventive medicine shall be dominated by physicians or hospitals.

The medical school has recently entered practice in competition with its graduates. This adds confusion to the already complex problems of how medical care shall be given and by whom.

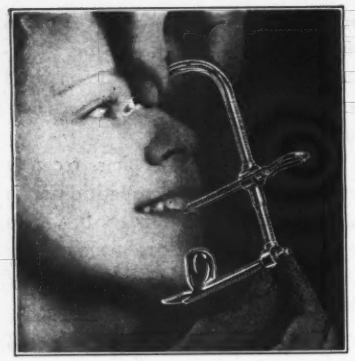
This trend will have some bearing on dentistry because of the growing recognition of the strong relationship between medicine and dentistry. The word "hospital" does not imply simply the familiar and friendly place where the physician carries on part of his practice. The broader concept means the impersonal and abstract thing, the hospital world, the association of hospitals, the microcosm of the planning commissions.

The keynote of the current tendencies was sounded in 1932 by the Committee on the Costs of Medical Care when it recommended that medical care be furnished by groups, organized around a hospital. Thus the hospital becomes the dominant factor in the delivery of medical services.

The importance of the family doctor in a program of adequate medical care is obscured in a trend toward institutionalized medicine with the hospital as the central figure. The statement, "The care of the cancer patient naturally revolves around the hospital. There he had his first treatment; there he will return for subsequent care," was recently made in an address to the American Cancer Society.

As evidence of the enormous social changes taking place today we have seen the broadening of hospital responsibilities to the point where many of them offer insurance plans which provide as benefits not only the use of physical facilities of the hospital but the services of medical specialists as well.

Even though the Blue Cross plans are admirable and serve an extremely useful purpose it is quite possible that the widening of these plans along with the expansion of the activities of our large teaching hospitals and medical schools may well form the



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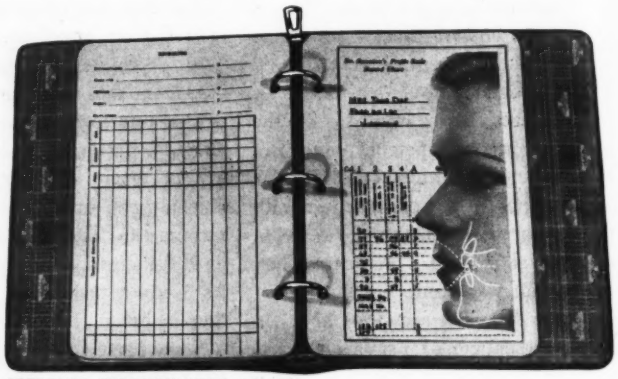

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spearhead of the attack which has for its goal the substitution of socialization for free private enterprise.

Today, the hospitals include such services as clinical pathology, anesthesiology and radiology among their services. The statement, "Diagnosis, treatment and the care of the ambulatory sick become increasingly the functions of the hospital as the hospital develops into the center of community health activities," appeared in the official publication of the American Hospital Association. Hospitals are urged to increase their revenue by educating the public to more regular use of the laboratory, the x-ray and diagnostic services for systematic check-up on its health.

The growing tendency of medical schools to engage in the practice of medicine is a disturbing phenomenon. Their legal and moral right to enter the practice of medicine seems extremely doubtful. Perhaps one of the reasons for such practice is the decline in revenue from tuition and fundamental or basic research and endowments. And in the end the only possible solution may be operation of medical schools by a paternal government.

Goin, L. S.: Medicine and the Future, J. Michigan M. Soc. **47**:505-508 (*May*) 1948.

Contra-Angles

Research is a word that we toss about with abandon. I know a dentist who speaks pompously of research work which has consisted of determining that it is necessary to warm wax before it may be used for an inlay pattern. He has also made a classic contribution and finds that a sharp bur cuts better than a dull one. In fact, this fellow has won himself a Master's degree from these profundities.

A dental teacher isn't worth his salt if he doesn't carry on a touch of research. It may consist of counting the periodontal fibres in an amoeba or studying the mineral content of the teeth of a Egyptian mummy. Such research is often reported with straight faces before scholarly dental groups and often finds its way into the printed page.

With the federal government taking an interest in dental research and with generous amounts of money made available for studies, it is time that we give a look to some of the dangers that are implied in doling out money. One of the best and most realistic statements on the subject was made by Doctor Isaac Starr, Research Professor of Therapeutics, University of Pennsylvania, before the American Pharmaceutical Manufacturers' Association.

Doctor Starr differentiates between

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Many candies are made of valuable foods in addition to sugar—butter, milk, cream, eggs, nuts and peanuts—and to the extent these foods are present, candies contribute biologically adequate protein, vitamins, and minerals.

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   (a) provide biologically adequate proteins and fats rich in the unsaturated fatty acids;
   (b) present appreciable amounts of the important minerals calcium, phosphorus, and iron;
   (c) contribute the niacin, and the small amounts of thiamine and riboflavin, contained in these ingredients.
4. Candies are of high satiety value; eaten after meals, they contribute to the sense of satisfaction and well-being a meal should bring; eaten in moderation between meals, they stave off hunger.
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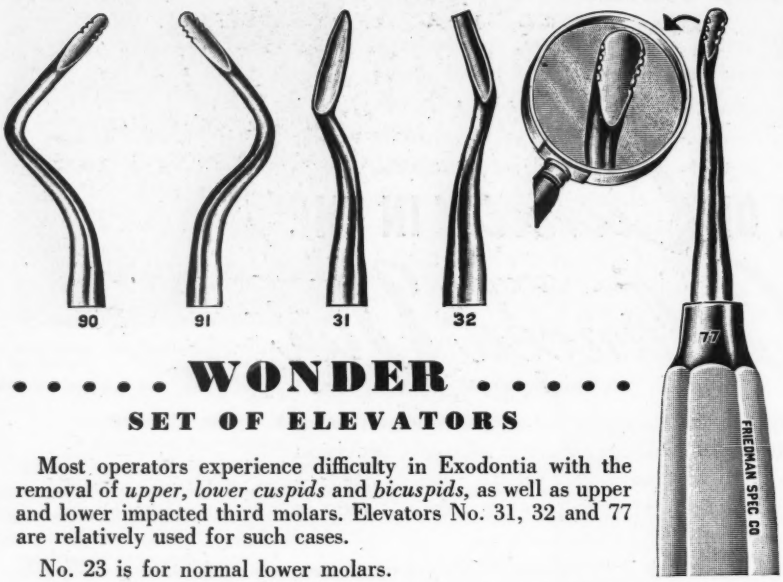

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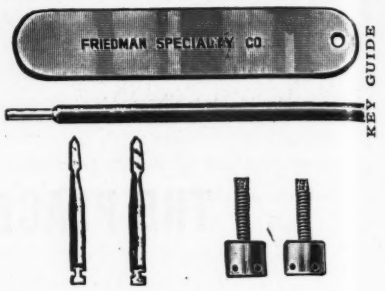

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developmental or applied research. The fundamental investigator is interested in the discovery of new facts, while developmental research is directed toward something *useful.* For example, studies on the nature of periodontal disease might be considered a basic or fundamental research. Studies directed toward the treatment of periodontal disease represent applied or developmental research. We need both kinds in dentistry.

Before deans of dental colleges get too ambitious with their research programs and their requests for grants, they will do well to read these warning signals raised by Doctor Starr:

"Danger 1—*That research will be turned into unprofitable channels.* It is easy to raise money for a specific need and difficult to raise it for a vague one. Indeed at this moment I believe that there is more money available for research in certain restricted fields that can be effectively used. In other words some agencies have more money than they know what to do with. But such groups, having raised their money by advertising the need for it, naturally feel that it must be spent, or next year's campaign would be conducted at a disadvantage. Therefore, they raise the ante and attract talent and personnel to their field of interest, and this without regard to the opportunities for advancing it. Now perhaps opportunities can be developed by this means, but I have seen good investigators leave promising problems to work in fallow fields simply because money could be so easily picked up off the ground.

"Danger 2—*Converting an investigator into an executive* . . . A brilliant young man about 35 years of age has produced a method which throws light on situations existing in disease, and gives promise of not only increasing our knowledge of what has gone wrong but also of estimating the effect of treatment upon it. He applies for a large grant, totalling $50,000 a year to survey interesting clinical conditions and to study the effects of therapy . . .

". . . What will the grant of $50,000 per year do to this young man? If he obtains the money, he must first assemble his team, let us say 4 research associates, 3 or 4 technicians, perhaps 2 secretaries and several dieners—equipment must be ordered, space found for them in the laboratory; housing for their families . . . Now our brilliant young doctor must direct their efforts, teach them how to use the new technique and keep them busy and contented. But this is not likely to be easy . . . For while the appointment to a university position in the old days carried a salary that was small, the employment was stable; whereas anyone on a project may be out of a job the moment it terminates. And to try to meet this hazard our young investigator must become a money raiser, giving time and effort to cultivating the interest and friendship of those with money at their disposal. What wonder if the executive work takes most of his time and effort.

"So our brilliant young man is in for many worries if we give him the money he requests, and his career

may also suffer in another direction. For a period of years the direction of his research effort is fixed. Suppose he suddenly sees the possibility of developing another and a very different method. He pursues this new aim only with great difficulty for he is tied to the target for which the money was granted, not only by the deed of the gift which might, indeed, be changed, but also by the nature of the personnel he has assembled about him, and for which he is now responsible.

"By giving a brilliant young man a large organization to direct we have taken away from him what he most needs for fundamental investigation; free time and freedom of action. I suspect the grant will convert him from a fundamental investigator into a developmental investigator.

"Danger 3—*Separating the investigator from his facts.* In a story you all know, Fleming observed the effect of a mold which alighted by chance on one of his bacterial plates and from this observation has stemmed great benefit to humanity and a mighty industry. Now let us suppose that during this same period instead of working alone with little assistance, Dr. Fleming had been financed by a grant of funds, a thing which might well have been the case had he been living in this country today. Surely no one would have opposed giving him a technician if funds had been available, and in that case the technician would have examined the plates and she would have found one contaminated by a mold. Would she have called it to Fleming's attention? My guess is that she would not, for the situation would have plainly suggested carelessness and bacterial plates contaminated by molds are a common occurrence in every bacteriological laboratory and have been for years. Only there was no Fleming to observe them.

". . . I do not doubt that by means of technicians using well established techniques one may elaborate on what is already known, but I see no likelihood that real pioneering will result from such a method, no matter how the money is spent. Would we, by giving Dr. Fleming a grant-in-aid have

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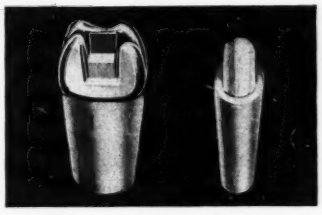

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prevented him from discovering penicillin?

"Danger 4—*That investigators will be corrupted* . . .In the old days the investigator worked on a pittance and research was done at a financial sacrifice. But this very fact was a guarantee of his high quality, a guarantee that has now been lost, at least in part, as the demand for investigators begins to exceed the supply.

"Do not think that I decry the fact that the wages of investigators are beginning to more nearly equal what they could obtain from other forms of work; far from it. But I fear I must decry several tendencies that I doubt would have appeared in the harsh old days. Not long ago a friend, a distinguished investigator, after several cocktails, boasted to me of the money he had raised for his work; the total exceeded the complete budget of certain medical schools in this country. Is he in a position to spend this money well? I think not, for he has spread himself too thin, and I wonder whether the responsible persons who represented the many organizations providing his funds, realized clearly when the grants were made, what proportion of his time he would devote to their interests. And I could not but notice that his boast was not of how the common good would be advanced by his efforts; but of his unusual competence as a money raiser.

"While irresponsibility of this magnitude is unusual, I have seen many requests for funds to support a research which, in my opinion, could have been done for far less than the amount asked.

"Investigators working on grants are subject to other temptations. They must be on their guard against the temptation to publish results prematurely, and to make exaggerated claims. It is to the great credit of these groups now providing money for research that I have encountered no attempts whatever to influence the results secured by the investigators they support, but the investigator is tempted to insure next year's grant by producing what is desired this year, and this is a real danger.

"Danger 5—*That medical schools will be damaged.* [Editor's note: Same goes for dental schools] . . . There exists a competition for personnel between those with money granted for research and the needs of medical education. I do not think this danger is serious. Research and teaching can be properly combined to the great advantage of both. It benefits investigators by keeping their interest broad, too often those who do nothing but research narrow their field more and more. Few people realize how taxing research may be and for me teaching has provided both interest and relaxation. But doubtless in the fear that research would be handicapped by an excess of teaching responsibility some grantors require that all the grantee's time be given to research. Perhaps a year or two of full time research is good for a young man, but I believe that almost all investigators benefit greatly by the stimulus of teaching and by the association with students.

"Unfortunately there is now a sharp division in the faculty of schools such as ours, the regular group often with little money to spend but with a position assured until retirement, and those supported by grants, who have ample money for their work, but who may lose their jobs at the end of any fiscal year. And many worries did I have, when dean, trying to do something for both plans and personnel left high and dry when grants expired and renewal was refused.

"Unhappily the competition for personnel between the grantees and the rest of the University is not limited to scientists. There is developing competition for dieners, technicians and secretaries. The grantee has money to spend and can offer high wages and medical schools are hard pressed for funds. The business of trying to keep a reasonable balance, to maintain a just and proper salary scale throughout the University, is becoming increasingly difficult in the face of competition from the grants and it caused me many headaches while I was Dean.

"Danger 6—*That unusually difficult problems will not be attempted* . . . A brilliant investigator working alone may try to accomplish things of unusual technical difficulty, but give him a team to supervise and the temptation is strong to use only standard techniques; things that assistants and technicians are able or can be easily trained to do.

". . . I have recently returned from a meeting in Washington where I was one of a committee assessing some 250 requests for grants. The new and bold ideas submitted could be numbered on the fingers of one hand. The great majority of applicants sought funds to work with methods someone else had devised, or ideas someone else had proposed. Many of these things were well worth doing but they were certainly developmental and not fundamental investigation. Is our present policy favoring the former at the expense of the latter? I believe that this danger is very real."

Under any federalized health system, great amounts of money will be put aside for research. Some of this

(*Continued on page* 136)

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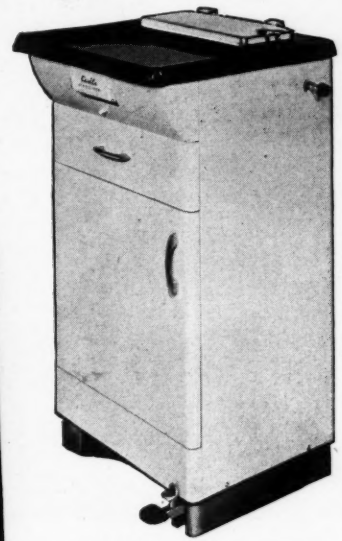

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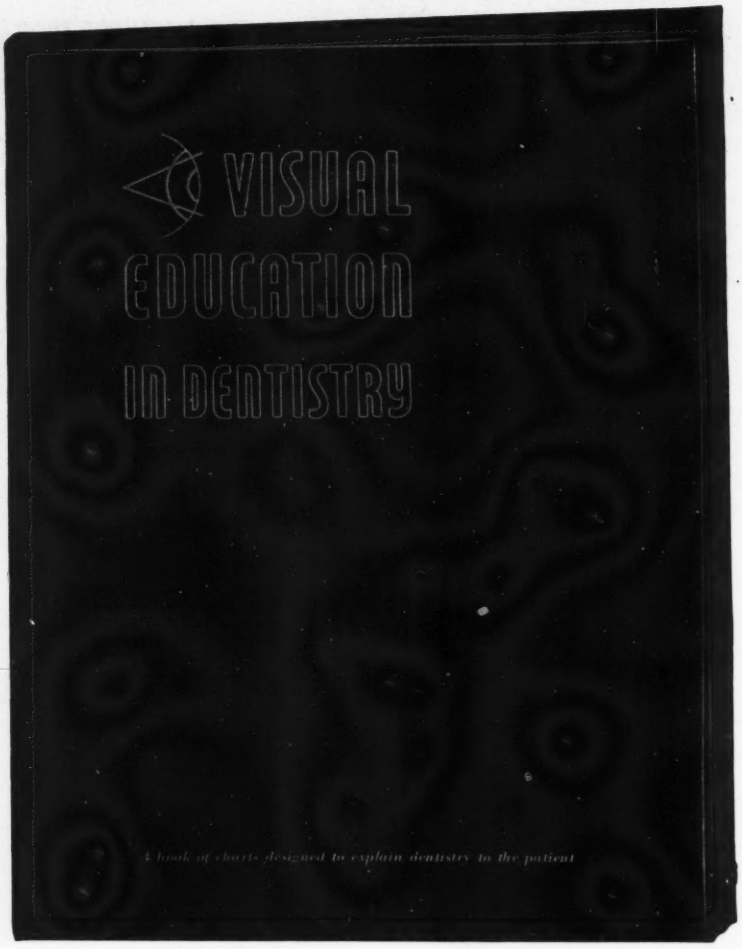

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CLINICAL AND LABORATORY SUGGESTIONS

(*See pages* 122 *and* 123)

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(*Continued from page* 133)

money will do good. Much of it will be wasted. Because money is available there will be a rush from laboratories and executive offices by men in white jackets and tweed suits—all with hands extended. For years dental research has been carried on without much support. In fact, many investigators worked without proper equipment or assistance. What they lacked in equipment they made up in imagination, enthusiasm, and arduous labors. There is a danger that with wealth at their hands research workers will become the tycoons of the test tube and the spirit of Pasteur, Erlich, G. V. Black, to mention three, will be displaced by the hucksters of the laboratory. When research is "supported" by public relations counsellors, cocktail parties in penthouse apartments, and longwinded "conferences," we can be pretty sure that the honest quest for truth will be deflected. —E.J.R.

The Neuromuscular Control of the Mandible

EDWIN P. SEAVER, JR., M.D.
New Bedford, Mass.

The neuromuscular mechanisms controlling the mandible form a labyrinth of nerves and muscles. The area of first importance is the receptive field of the chewing reflex. This consists of the skin and mucous membrane surfaces of the lips, cheeks, and tongue.

Intimately associated with the exteroceptive field of the chewing reflex is that of the deep field, represented by the muscles, tendons, fasciae, ligaments, and periosteal tissue attached to the mandible and temporomandibular joints. This proprioceptive field is equipped with receptors for muscle and tendon stretch, for pressure and for pain.

A certain degree of stretch is exerted on all muscles by their normal origin and attachments, particularly the antigravity or extensor muscles. This basic factor of stretch which determines the degree of tension of a muscle affords a clinical explanation for the hypertension and hypotension

found in the masticatory muscles in the presence of malposture of the mandible.

Analysis of the Central Nervous System

In these receptor organs occurs the initiation of the reactions of the nervous centers, located in the central nervous system. The pathway over which a reflex travels, called a simple arc, consists of the following:

(1) A receptor organ, (2) an afferent neuron, (3) an efferent neuron, (4) an effector unit (muscle).

Afferents *from* the mastication field enter the brain stem as sensory nerves of the fifth cranial or trigeminal nerve. Efferents *to* the masticatory muscles leave the brain stem as motor nerves of the trigeminal (fifth) cranial nerve. Trigeminal reflexes may utilize muscles supplied by motor nerves found in at least six cranial nerves.

Posture the Basis of Movement—The lips, cheeks, and tongue play an important role during mastication. When in rest, the mandible is mediated by the jaw-closing muscles reacting against the pulling force of gravity. The result of this action-reaction interplay sustains tension, or muscle tonus.

The jaw-closing or antigravity muscles counteract the force of gravity. It is from this postural position that movement of the mandible starts, and to which it returns. This is the crux of the dynamic situation underlying the neuromuscular control of the mandible.

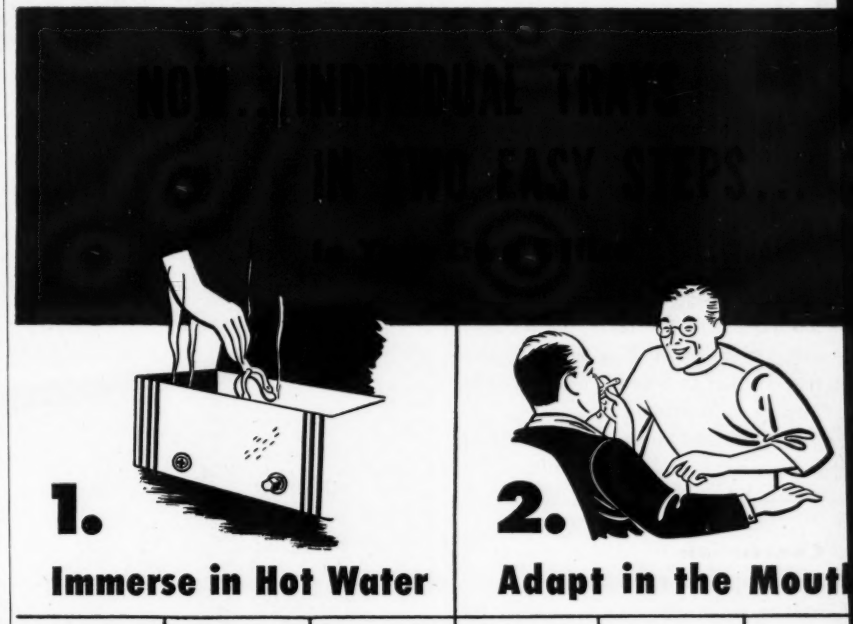
Voluntary Control of the Spinal Centers—The motor nuclei of the cranial nerves, located in the brain stem, are the cerebral equivalent of a spinal center. In the cerebrum receipt of stimuli from the periphery initiates reactions of the motor cortex and stimulates primary areas in the sensory cortex (somesthetic areas). The cerebrum informs the cerebellum of the motor activity it is initiating, and the cerebellum in turn modifies and regulates it.

Voluntary motor stimuli arising in the cerebral cortex may be the decisive factor in the struggle between the "plus" and the "minus" stimuli. In this way unconditioned reflexes may be brought under control of the will.

This is the basis upon which neuromuscular training is made possible and is practiced in clinical medicine. If the relatively very complicated motor act of speech can be reconditioned, then it is reasonable to assume that neuromuscular training of the muscles controlling posture and movement of the mandible is attainable, for it is a far simpler procedure in correcting malposture and movement in cases of acquired malocclusion, than that involved in speech defects, i.e., stammering and stuttering.

Discussion

1. The resting posture of the mandible in all three planes is determined



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by the reflex balance existing between the jaw-opening and the jaw-closing muscles.

2. While resting, the mandibular complement seeks the position easiest to maintain and when functioning in chewing will contact the maxillary complement where it is mutually most comfortable to do so.

3. The presence of a noxious factor may cause the neuromuscular mechanism of the mandible to move away and establish a new location from which to posture and perform. This is a functional adaptation.

4. In malocclusion potential injury is imminent and actual injury frequent.

Conclusion

In approaching correction of acquired malocclusion, (a) search for noxious factors in the receptive field of the chewing mechanism, (b) re-establish normal anatomic muscle relationship in all three planes, (c) recondition the sensori-motor cerebral field and supply corrective neuromuscular training to re-establish and maintain balanced occlusion.

Adapted from *Am. J. Orthodontics*, **28**:222-229 (April) 1942.

The Evaluation of Dental Caries

(*Continued from page* 116)

c) There is a need for a comparative study of young diabetic patients under various degrees of control.

d) The systemic condition has little or no effect on dental caries.

Further study is required to determine how a genetic factor or an emotional state may influence caries.

3. *The Effectiveness of Oral Hygiene*— a) Thorough prophylaxis will remove bacterial plaques from the accessible surfaces of the teeth but not from pits, fissures and contact points.

b) The possibilities of toothbrushing as a preventive measure should not be ignored. There is evidence that teeth should be brushed immediately after each ingestion of food.

c) The sugar content of commercial chewing gum is approximately 60 per cent by weight.

d) If lactobacillus counts can be accepted, there is substantial reduction in the caries attack rate when certain medicated dentifrices are employed.

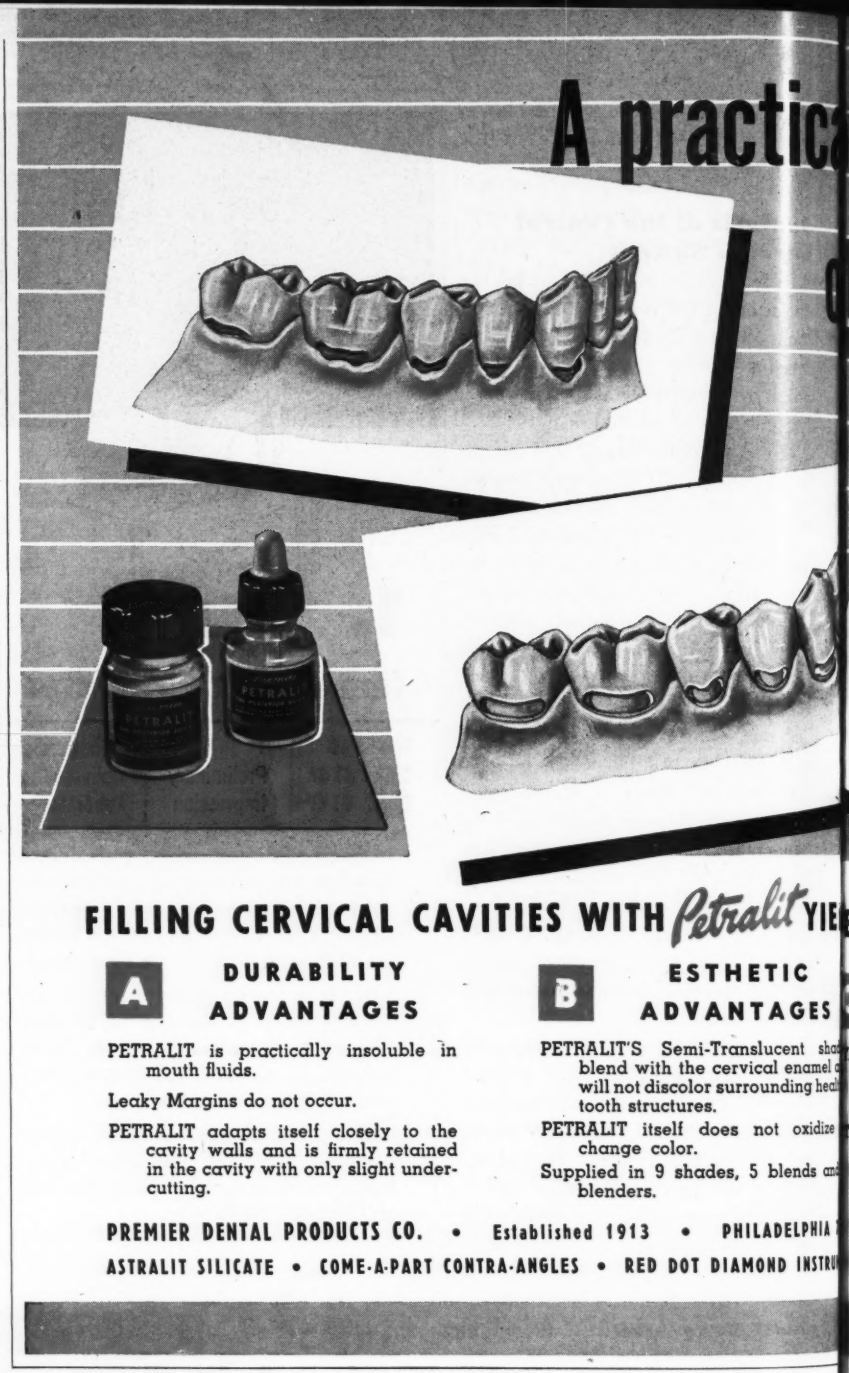
4. *The Utilization of Fluorides and Silver Salts in the Control of Caries*— The inverse relation between the consumption of fluoride-bearing domestic water and the prevalence of dental caries in children has been established. The evidence indicates that:

a) The DMF rate is approximately 60 per cent lower in children between 12 and 14 years of age who throughout life have ingested communal water bearing naturally about 1 p.p.m. of fluorides.

b) Caries reduction in the upper anterior teeth may be lowered as much as 90 per cent. The reduction is markedly less in the posterior teeth.

c) No toxic effect follows consumption of water containing up to 1 p.p.m. of fluorides.

d) The mechanics responsible for the inhibiting effect of fluorine is not clearly understood.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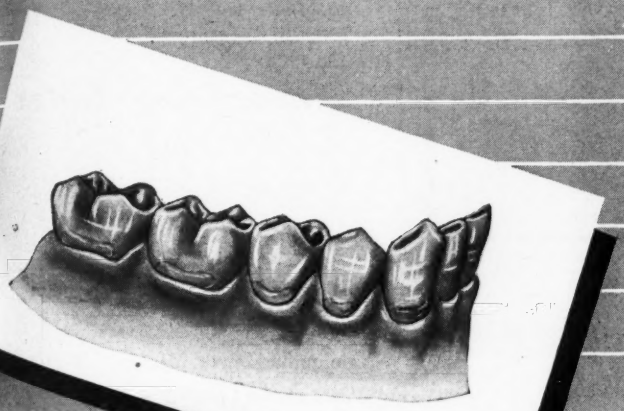

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e) Studies are now under way to test the efficacy, safety, and practicability of fluorinating a community water supply.

f) Caries reductions of approximately 40 per cent have been observed in the teeth of children treated topically with 2 per cent sodium fluoride solutions. The protective effect of the treatment lasts three or more years.

g) The means by which natural or topically-applied fluorine exercises its protective effect is obscure.

h) Although bone meal contains fluorine, it has not been established as a good source of this element and there is insufficient evidence that caries can be controlled either in children or adults by its use.

i) Fluorine is toxic, but in the strengths and amounts recommended in this evaluation its use in skilled hands is without danger to the patient.

j) Based upon the evidence of preliminary investigations, there may be some caries-inhibitory effect following the use of sodium fluoride mixed with pumice as a prophylaxis powder or paste.

k) It has not been adequately demonstrated that the incidence of dental caries can be reduced, or progress of the carious lesion retarded, by the topical application of silver nitrate.

5. *The Relationship of Vitamin and Mineral Ingestion to Dental Caries*—The ingestion of vitamins and minerals, in amounts above those required for a normal diet, has not been proved to have any relationship to dental caries.

6. *The Contribution of Various Types of Diets to Caries Control*—From the standpoint of nutrition, certain trends in food consumption have enriched the diets of the American people while others have impoverished them. On the credit side, for example, is the increase in consumption of dairy products, fruits and succulent vegetables; on the debit side, the increase in the consumption of refined sugar.

In your ORAL HYGIENE this month

Fit Your Dentistry into the Patient's Picture

Patients get some strange ideas about what a dentist can do in the way of treatment and restoration, and what he should charge for such work. It takes tact and effort to correct their misconceptions, but it's well worth while. Doctor Leo B. Dillon suggests that it's necessary to *see* the patient's mental picture of the service he expects from you before you can *change* that picture if it is false or distorted.

★ ★ ★

Of course you never lose your temper . . . Or do you? Doctor William Roy Eberle cautions, "Lay That Temper Down, Doctor," and explains that many petty irritations can be anticipated and prevented. If you're inclined to "blow up" from time to time, better read this sound, practical article.

★ ★ ★

"Let's Speak English," urges Doctor Stewart Everson, as he continues the discussion begun by a dental patient who complained, "My Dentist Talks Double Talk," in the September issue. Conversation, to be understood, must be in words that the listener, as well as the speaker, understands.

★ ★ ★

What's your attitude toward other dentists and particularly toward the work they do? Doctor Rolland B. Moore suggests that many a dentist thoughtlessly loses a new patient's good will by criticizing work done by a dentist in whom the patient has confidence. It's dangerous to say, "Whoever put those inlays in didn't know what he was doing," dangerous to you, and to the dental profession you represent.

★ ★ ★

"Try This on Your Deadbeats!"—advises Doctor W. A. Morin as he gives his own successful method of collecting overdue accounts.

★ ★ ★

Now that your service days are well in the past, have you forgotten your resolution to "do something about conditions in the Dental Corps" when you regained civilian status? Doctor Floyd L. Paynter, in an article, "What's All This About Autonomy?," reminds you (and the profession) of the present need for action.

★ ★ ★

"Socialized Dentistry in England," an article by William F. McDermott, tells clearly what "can't happen here"—but might.

★ ★ ★

Do you have others working for you? Are you having a hard time keeping the necessary records of withholding taxes, social security payments, and other items? Betty Lee Gough outlines two methods of keeping "Simplified Wage Records," in a short article which will surely save you many times the minutes it will take to read it.

Research indicates that the restriction of sugar, either refined or natural, is effective in the control of dental caries and will improve the dietary, provided the caloric intake remains adequate. The harmful effects of sugar, refined or natural, are not reduced by the addition of vitamins and/or minerals.

*Reported by J. M. Wisan, D.D.S., in *The Bulletin of the American Association of Public Health Dentists* 7:10-14 (*November*) 1947.

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